

Vadim Ryabitsev

ONE SEASON IN THE TAIGA



RNP

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Vadim Ryabitsev

Two ornithologists live in a tent on the bank of a small river in the northern taiga in order to study some unprepossessing little birds - warblers. The lives of several of these 'feathered heroes' unfold before the reader's eyes. Each has its own character and destiny, involved relations with its neighbours, and struggles against predators and the weather.

Vadim Ryabitsev is a professional ecologist and ornithologist at the Institute of Plant & Animal Ecology in Ekaterinburg on the Urals. In an attractive and accessible manner he writes about scientific problems and shares with his readers his thoughts, doubts, and search for the truth.

The book is illustrated with the author's own drawings.

'One Season in the Taiga' will be enjoyed by naturalists, ecologists, students of Russian, and anyone interested in the outdoors or Russia.

Вадим Рябицев

ОДИН СЕЗОН В ТАЙГЕ

Перевод Г.Х.Харпера



Vadim Ryabitsev

ONE SEASON IN THE TAIGA

Translated by G.H. Harper



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TRANSLATOR'S NOTE

First, a word on the Notes. Since the book was written in Russian for Russians I decided to add notes giving additional information (mostly scientific and linguistic) of possible interest to the English-speaking reader. They are gathered at the end of the book to avoid annoying readers wishing to skip them.

I have enjoyed translating this book, although it has been by no means easy. Thank you, Vadim, for your patience (over several years), your help with the Notes and with passages which needed explaining, and your hospitality in Russia, both in your home and out in the wilds of the Urals and the forest-steppe.

Ellie Kemp read the translation, and it has benefitted from the vast majority of her suggestions. Any remaining errors and inadequacies are mine alone.

Geoffrey Harper

PUBLISHER'S NOTE

The book you are about to read belongs to a tradition of Russian natural history literature. In trying to choose a design for *One Season*, a large number of English-language works were examined without finding any that could serve as a suitable model. Perhaps this was a waste of time, since there is no shortage of well-designed volumes in the same tradition from the Russian presses.

Examples are A.N.Formosov's «Среди природы» (In Nature) and «Спутник следопыта» (Tracker's Companion), and E.P.Spangenberg's «Из жизни натуралиста» (From a Naturalist's Life), «Записки натуралиста» (A Naturalist's Notes) and «Встречи с животными» (Encounters with Animals). Each of these books is illustrated with wonderful pen-&-ink drawings - Formosov's own, and those of A.N.Komarov in Spangenberg's books.

The design of Vadim Ryabitsev's *One Season in the Taiga* has been unashamedly modelled on the Russian style of these other works. They were the books on which naturalists of his generation were raised, and *One Season* is a welcome and worthy continuation of the tradition.

Publication of the book in this form would not have been possible without the generous donation of printing costs by Hetty L.Harper. My thanks go also to Myrtle and Philip Ashmole, Rose France, Richard Lines, Jaleel Miyan, and Trevor Poyser .

Russian Nature Press

PREFACE

Nowadays it is difficult to find anyone who has not heard of ecology. In radio and television programmes and in magazine and newspaper articles you often meet such phrases as 'ecological problems', 'the ecological crisis', and 'ecological principles'. Everyone knows about the 'ecological' or 'green' movement, with its parties, meetings, demonstrations and international organisations. As a result, most of those who are not connected in some way with science understand ecology to mean something to do with saving the environment.

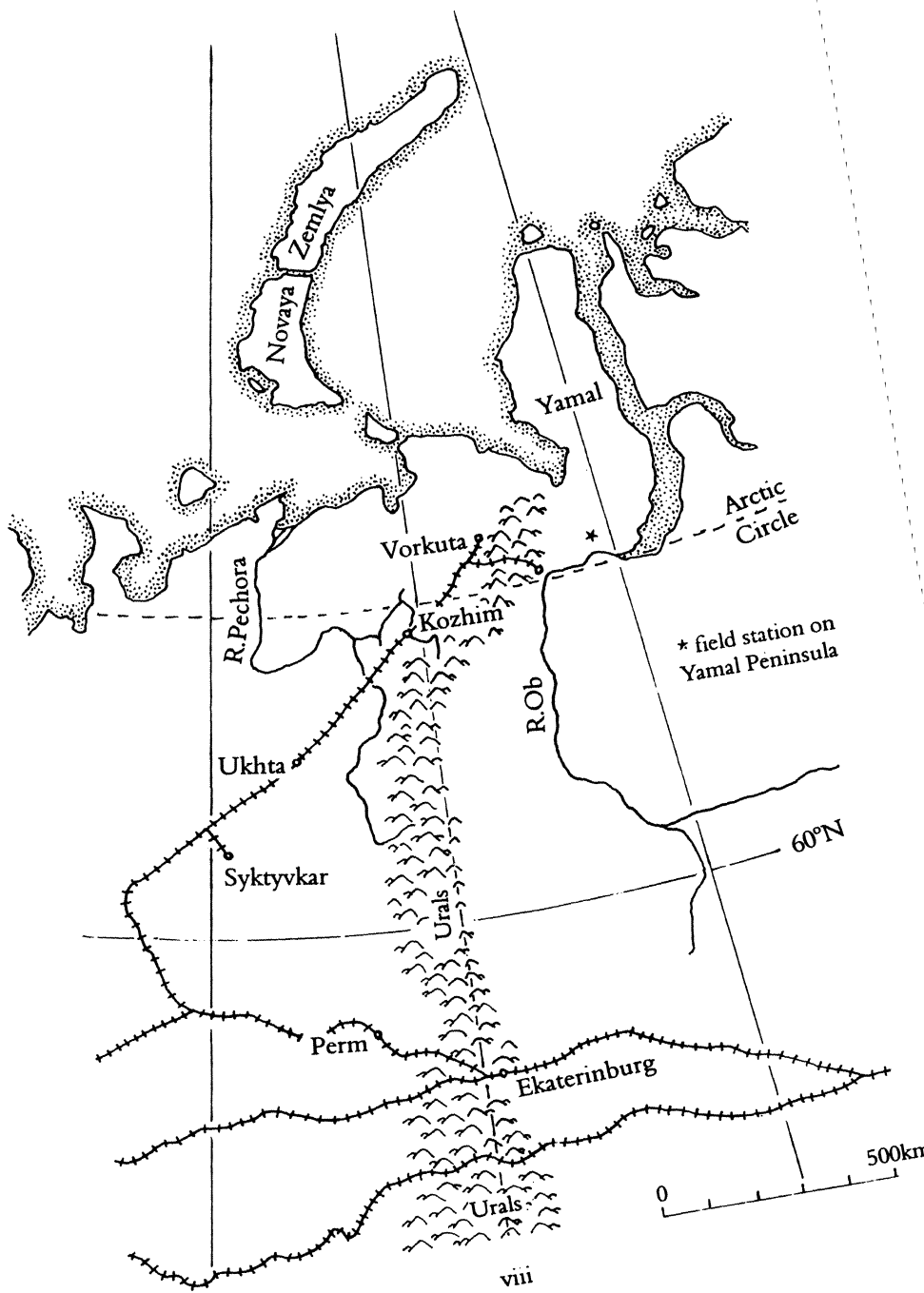
To the uninitiated it must seem strange for someone running around with a butterfly net or counting the plants in a square metre of meadow to be called an ecologist. But this is much nearer the proper use of the word. Ecology is the science of the relationships between organisms, and between them and their surroundings; it is the science of natural communities. Working out the principles underlying nature conservation and environmental protection is only one of the ultimate practical aims of ecologists. There are many different ways of reaching this goal, and not all of them fit conventional ideas of what serious and useful science should be all about, and what ecologists do.

Ecological research - like that of most scientists - is more often than not painstaking drudgery lacking any appeal whatsoever. Maybe this is why there are so few popular books describing how ecologists go about their work. I should like to tell you something about the work of ecologists who, by studying birds, are trying to discover the laws of living nature. I should also like to describe the birds themselves, especially their behaviour, and explain why we are studying them.

In working with living animals and birds in their natural habitat, biologists also find themselves in conditions not so different from those of the creatures they are studying. So scientific field work means not only observing and experimenting, but also enduring the rigours of life on an expedition, with all the unforeseen events and unexpected encounters that involves. Every field season leaves you with its own completely individual impressions, unique nuances and special aftertaste. Even the smoke from the camp fire smells different every time.

This small book is the account of one modest expedition. I hope I have managed - even if only to a small degree - to give you, the reader, some idea of our work in the field and the scientific problems we were trying to tackle. It is a little story about the lives of some ordinary woodland birds, the world they live in, and ourselves studying them.

Vadim Ryabitsev



1. IT ALL DEPENDS ON THE GOAL ВСЕ ОПРЕДЕЛЯЕТСЯ ЦЕЛЬЮ

How much time is needed to prepare an expedition? The first polar explorers and organisers of round-the-world voyages spent years on it, devising plans and routes, selecting the expedition members, and writing out lists of essential equipment and supplies - everything from ships and sledge dogs to buttons and nails. Then they purchased or ordered them, or even made them with their own bare hands. Their lists were littered with ticks and crosses, and from time to time they remembered something else and wrote more notes.

There is no doubt that the general procedure for preparing an expedition, on whatever scale and however heroic, has not changed substantially since those far-off pre-Columbian times.

The first thing to do in any such enterprise is to determine its goal. It is that which dictates not only the route or place of work, but also the list of what to take. So the first thing I should be doing is to explain the aims of our trip.

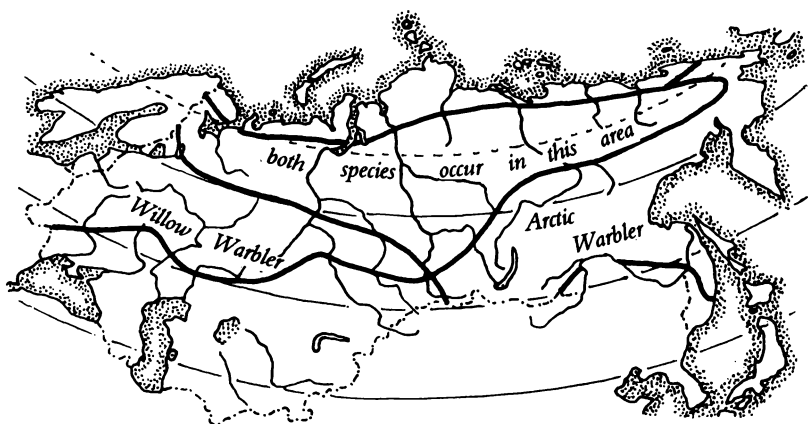
I'll start with a hypothetical example from ecology. Why are there, here in the central belt of Russia, birch trees but no palm trees? Every school child knows the reason: birches can survive the winter while palms cannot. The palm keeps its leaves all year round and needs a constant warm climate. But the spruce also keeps its leaves in the winter, and that does grow here. The spruce and palm are similar in being evergreen, but they live in quite separate areas. On the other hand the birch and spruce grow side by side, but the birch loses its leaves in the winter while the spruce does not. The two trees are adapted to the same conditions in different ways. They are however in no way related - one is a flowering plant and the other is a conifer. Now consider another tree, the larch. It is a conifer, but is like the birch in being bare all winter. So the unrelated birch and larch have identical adaptations to winter, while the related larch and spruce are quite different in this regard.

These similarities and differences are so obvious that there is no need to make a song and dance about them. Given the differences, we only need to ask 'why?' or 'how?'. How for instance can the spruce needles survive the winter while those of the larch cannot? To answer this question the scientist would have to make a thorough study of the needles' structure, their chemical composition, the form and structure of their cells, and much else. Only by comparing the results would it be possible to say what enables one tree to grow where the other cannot, and why two trees growing side by side react in such different ways to identical conditions.

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So, as I have already mentioned, ecology studies the mutual relationships of organisms, and their interactions with their surroundings. But one cannot study 'the organism' as such, simply because no such abstract thing exists. Instead there are trees, shrubs and herbs, insects, fish and birds. The botanist studies plants, the entomologist insects, the ichthyologist fish, and the ornithologist birds. If at the same time they study ecological problems, then they are also ecologists. We - the two members of this expedition - are ornithologists and ecologists.

The organisms we are to study are two almost identical small brown birds - the willow warbler and the arctic warbler. Why did we choose them? The distant ancestors of the willow warbler¹ are known to have lived in Africa and southern Europe before they spread northwards and



eastwards. The species now nests over an enormous area stretching from western Europe to Chukotka. The arctic warbler² on the other hand hails from southern Asia. Its present range includes all of eastern and northern Siberia, and also northern Europe as far as Scandinavia. Thus our two warblers have quite different origins, but now their ranges overlap. Only for the winter do they fly off in different directions, the willow warbler to southern Europe and Africa, and the arctic warbler to south-east Asia, in other words back to where their ancestors lived once upon a time.

During the summer the willow and arctic warblers experience exactly the same environmental influences. How have these two species, so similar and at the same time so different, adapted to life in our taiga³ - in

THE GOAL

the same way or differently? To answer the question it will be necessary to study both of them and then make comparisons, just as in the case of the larch and spruce needles.

No organism lives in isolation from its own kind. Other warblers are as much a part of an individual warbler's habitat as are the trees, insects, mammals and everything else that lives in the same forest. So this is what we intend to study. Details will emerge later, as the story unfolds.

The expedition is not large - there are only two of us. My companion is Sergey. We have already been on several expeditions together, so we know that we work well with one another. Sergey is several years younger than I am, and the warblers will be the subject of his first independent research. It is his job to sort out exactly how similar and how different the two warblers are, and why. This approach is called comparative ecology. My task is mainly to study their behaviour. Of course the division of labour is rather arbitrary, and we shall in fact be doing the whole job together.

Once the goal is clear and the subjects of study have been chosen, we select a place. This means rummaging through books and maps, quizzing colleagues and swapping ideas. The northern parts of the Urals⁴ are approximately in the middle of the area occupied jointly by our two warblers, and the best site for us would be in the Subarctic Urals, in the taiga of the foothills. Both warblers are abundant in the area, so there should be plenty of them for our research.

For a more exact location we take into consideration the convenience of the site. It ought to be reasonably easy to reach in the spring when roads are impassable. Then again, being near to a settlement would guarantee proximity to medicine in case - heaven forbid - the expedition first-aid kit and our meagre medical knowledge are suddenly found to be wanting. Up to now the worst ailment in all the years of our expeditions has been toothache. But anything could happen. If there is no need to take risks it would be best to play safe. And if we have miscalculated our supplies, a settlement with a shop would not be unwelcome.

Working from these assumptions alone, the settlement itself on some reliable transport route might suit us well, or somewhere near it. But there are other requirements for ornithological field work which often force us to go far off into the wilderness. The site should be subject as little as possible to the worst of human influences, that is, it should be far from those places where machinery roars, cattle graze, holiday-makers or undesirables roam about, or indeed where cats and dogs are

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running around, since they often remember that they are predators and behave accordingly - by preying on our birds. We should ideally study our subjects in their natural and undisturbed habitat, since otherwise we risk seeing them as through a distorting mirror.

So once more we search through books and maps, cross-examine colleagues and acquaintances. At last the place is chosen: we must go to the River Kozhim. It springs from the glaciers and snowfields of the Subarctic Urals and flows west to the Pechora. There is also a settlement - Kozhim - which can be reached by rail.

2. WE SET OFF

ПОДНИМАЕМ ПАРУСА

Any serious expedition requires a long period of preparation, and we spent all winter preparing for this one. We even set aside every Monday to get ready for the field.

There was a great deal to do. We made mist nets¹ from fine fishing net for catching the birds. We manufactured tiny rings from coloured plastic to put on the warblers' legs, so that we should be able to tell each one individually by the colour combination of its rings. Some things had to be fetched from the institute's stores, others had to be found in shops or heaven knows where. The list of things we needed filled seventeen pages in a notebook.

But, however careful the preparations, there is always panic just before departure. There are always essential things to be done in the last few days - documents, tickets and maps to be sorted out, equipment to be dispatched, and so on.

On 7th May, in our institute's Botanic Garden, directly opposite our window, a nightingale² started singing. In recent years we had only heard the song of the nightingale on records, as we usually set off for the north before the nightingales arrived in spring, and returned home only when they had stopped singing. Yet here, astonishingly, was a real live nightingale.

If you are in no hurry, it is very pleasant to pass the time of day listening to the song of the nightingale. We had no time for this, however, and the nightingale made us in even more of a hurry to be off. It was not for nothing that the bird had come so early: it was a sure sign that spring was arriving earlier than usual. We might be late: the warblers might arrive before we did, and then we might miss something important. We had to get a move on.

WE SET OFF

So here we are, on our way at last. The train leaves Sverdlovsk³ and heads northwest, crossing the Urals. These are gentle low hills, calm and beautiful; we, on the other hand, are still agitated from the rush of the last few days. The journey is a stimulating one. The view out of the window changes constantly, and there is a bustle of activity at every station. The people we see vary immensely - in appearance and character, in the clothes they wear and the things they are carrying. On a journey you feel with great immediacy how large the world is.

Even on the way to a place you know well, you expect to see something new. And we were going somewhere we had never been before. This field season was to be a change for us: it was the first time that we were to work in the forest, in the taiga. Although our home is in the Urals, in a forested area, and we know it all inside out, for many years now our field work has taken the form of expeditions to the tundra⁴ of the Yamal Peninsula⁵. We have fallen in love with that desolate and at first sight bleak terrain. Now we are travelling northwards once more, but this time to the northern taiga. It will certainly be nothing like the tundra. How shall we get on there?

Long before our departure we had a presentiment of an entirely new experience, and with it a pleasant feeling of uncertainty. Now, in the train, this has become the dominant emotion. The 'aching feeling of the road' is how it has been aptly described.

Night sounds reach us through the open window above the rumbling of the wheels - the creak of corncrakes⁶ and the 'ooeek ooeek' of spotted crakes⁷. And once again we hear a nightingale, trilling and calling mockingly after us with its whooping cry. Spring smells, some heavy and drowsy, some sharp and pungent, penetrate even the stale, far from fragrant air of our carriage. It is impossible to sleep. During the day we discuss the details of the work ahead of us and glance uneasily out of the window at the foliage, which seems far too lush and luxuriant. Here too, west of the Urals, spring has come early.

Now we are on another train. This one is bound for Vorkuta. Occasionally we catch sight of a bird through the window - a lapwing⁸ in a meadow, or a bunting on the wires beside the line. More often than not, though, it is just some unidentifiable little brown bird. At moments like these we wish that the train would stop a moment on account of some minor hitch, so that we could fetch the binoculars from our rucksacks, open the window and have a good look; or, better still, get down from the train and stand on the embankment.

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Quite unexpectedly, however, some real bird life makes an appearance right in our midst. A man is gradually making his way through our carriage. He is short, with a magnificent white moustache and side whiskers, and a thinning grey head of hair over a high forehead with prominent temples. Evidently he once had very black hair; perhaps he is a gypsý. And on the man's shoulder there sits a raven!



The man passes slowly down the corridor, examining the passengers with a calm, dignified air. He finds a seat in the compartment next to ours and greets the other passengers, who reply in a somewhat reserved manner. They are three men travelling together - miners returning from holiday, to judge by their conversation. They have been chatting over a bottle of vodka. At first, like us, they are struck dumb, and can only gaze at the extraordinary man and his bird. Then they begin to talk again, and it becomes very lively in the carriage. Someone else joins them and soon they are all sharing drinks and food, and giving crumbs to the raven. The bird delicately takes the offerings from their hands, ruffles its feathers, and looks inquisitively about it with its intelligent dark eye, occasionally letting out a short hoarse croak.

WE SET OFF

Our train passes through Ukhta, Pechora and Inta - places to which many people came not of their own free will, people whose fortunes had been ruined and whose lives had been shattered. Condemned for misdeeds, for words spoken, for thoughts, or indeed for nothing at all, many nevertheless stayed in the north after being released from the 'Zone' They stayed with the way of life they had become accustomed to, with the tragedies they had endured, with their suppressed grievances.

There is a peculiar atmosphere on these northern trains. And this strange man, with the enormous black bird and the look of a sorcerer, was not perhaps so out of place after all.

We hear loud discussions about Life coming from the next compartment. The gypsy is telling tall stories about his raven, claiming that it is exactly two hundred and forty years old, and that it can speak - but is too shy to do so in company. Then they begin to sing. Some of the songs we know, like the one about the Vorkuta-Leningrad train, and another about the locomotive that was once buried during a blizzard. At some time, long ago, these songs emerged from the prisons and camps and were set free to wander the length and breadth of Russia.

The man with the raven gets off at a small station. He has no luggage, and his back is white with the disgusting stains of bird droppings. When he opens the door the raven very loudly and clearly, with his owner's voice, arrogantly calls 'Per-r-mit!'

To reach our station, though, we still have to travel most of the night. At four in the morning we alight at our destination, Kozhim. The train disappears around the corner. It is quiet, sunny and quite cold. From a willow covered in catkins we hear the loud song of a willow warbler. They have beaten us to it.

Our boxes of equipment, dispatched a day before our departure, are standing forlornly on the deserted platform. The stationmistress appears, 'issues' us with our boxes by checking them against a ticket, and disappears again. There is not a soul around.

We would like to be travelling on without delay, or walking somewhere, running, doing something! There is a settlement nearby, but it is still asleep. Even though it is completely light, it is still night time. And of course it is not the done thing to wake people you don't know in the middle of the night. There is nothing for it but to sit down and wait.

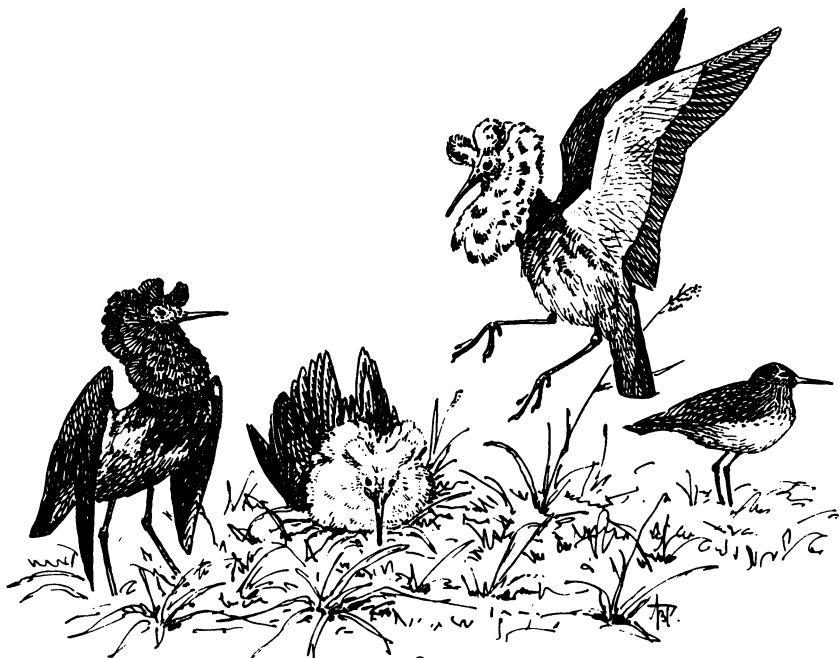
So we wait. Now we have an excuse to stop, listen, and look around us, to breathe in the smells of a strange forest. There it is, beyond the railway. There are the dark spruces and firs, still looking wintery, and

ONE SEASON

among them dazzling white birches. But the willows are already in flower, looking as if they were wreathed in clouds of greenish-white smoke. This might be any forest, but at the same time it is special, a northern forest. Even here, right beside the settlement, it seems wild, uninhabited.

We make the first entries in the field notebook - a list of twenty bird names, the ones we can hear around us. Such notes are an indispensable part of field work and have become an involuntary habit. Wherever an ornithologist goes, no matter what the object of the journey, one pocket contains a notebook. We fish out our binoculars - the most important piece of our equipment, and never packed with the other instruments.

Our wait becomes a pleasant sedentary bird-watching session. There is practically no snow left, just a few dirty patches here and there in the forest and in the ditch by the railway. Not far from us are some snipe⁹ in a tussocky bog. The males are uttering frenzied mating calls, and time and again we hear their vibrating 'bleets' from one side or another. On the pools near the station buildings we can see ruffs of various colours and reeves¹⁰ running about feeding. Another party of birds flies in to join them. At this the males immediately begin to run and jump around, fluff out their ruffs and strut about. The reeves continue picking their way unconcernedly among the flooded herbage, pecking at this or that, or



WE SET OFF

just standing looking bored. The ruffs do not display for long. Suddenly for some reason they become alert, take off and fly north-east, directly along the railway line.

Morning is the best time to hear the songs of all the daytime birds. Here in the taiga the woodland chorus is wonderful. And the most important voice in the chorus, at least for us, is that of the willow warbler. We learn from the stationmistress that the weather here warmed up only two days ago; before that it was windy and cold. The snow has melted mainly since then. That means that it is probably only in these last two days that the willow warblers have arrived.

In the settlement we have to find Vladimir Solomonovich Indukov. His surname is like the Russian for 'turkey', and it would be comforting to think that a man with such a name¹¹ might be a sign of good fortune for us *púchniki*¹² (bird people). But, most important, he is a friend of a friend, and we have a letter with us, asking him for help. My friend has assured me that we shall have no trouble finding Indukov in Kozhim: as the Russian expression goes, 'every dog knows him'. Kozhim is a small place, and no doubt every local dog knows anyone who stays here even only a few days. Still, we hope that they will not have the chance to make our acquaintance. We must not hang around here for long. We have no time. The willow warblers are already back!

One of the dogs runs up to us and begins examining us and our bags with some curiosity. Sergey cannot resist asking it where someone by the name of Indukov lives hereabouts. The dog wags its tail in a friendly fashion, then whether from confusion or because it has an itch behind its ear it shakes its head several times - so wonderfully apt that we burst out laughing. The mongrel takes offence and runs off.

Soon the settlement's inhabitants begin waking up, and when they appear on the street they point us directly to Indukov's house. He turns out to be a short curly-haired young man, very friendly and energetic. We introduce ourselves and are soon calling each other 'ty'¹³. Volodya quickly becomes infected with our enthusiasm when we outline our aims and explain our anxiety at arriving late. He confirms that spring has gone mad and began almost a month earlier than usual. The ice on the river was on the move by 20th April.

'The old folk can't remember anything like it!' Volodya intones the familiar phrase, of which a humorist once declared sarcastically that the old folk only exist so that they can't remember things. Mention of the old folk and spring having gone berserk give us some excuse for our lateness, but that does not change matters.

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Indyukov recommends that we go to the Syvyu, a small tributary of the Kozhim on its left side. It takes three or four hours to reach by motor boat against the current. All well and good, Syvyu it will be. It sounds strange to the Russian ear, but that is hardly surprising since this is Komi¹⁴ country.

Volodya must be at work today, so we plan to leave during the night. Meanwhile we buy provisions, repack our baggage and change into field work gear.

When the sun touches the horizon we are already pottering around by the motor boat on the bank of the Kozhim, trying somehow to be of assistance to Volodya. After being laid up for the winter his 'Vikhr' engine won't start for some reason. Here with us, gazing longingly at the boat, is a strapping great wolf-like laika. It is Indyukov's dog, and has the most undoglike but somehow ominous French name 'Lyusen'.

We try to avoid the mosquitoes. Here they are, wretched things, the first unpleasant feature of spring in the taiga. On the tundra we are accustomed to being blessed in spring by the absence of mosquitoes, but here this brazen two-winged tribe has already laid claim to our blood. We angrily rub in 'DETA'¹⁵ - it will give some relief.

When we cast off from the bank the sun is already climbing in the sky. There has been no night - the Arctic Circle is only some hundred kilometres or so further north.

Magnificent cliffs hanging over the water pass by us very slowly, even though we are tearing along quite fast against the rapid current. For a long time Lyusen runs along the bank, sometimes getting well ahead of us. After a few frightening bellows from his owner he reluctantly comes to a halt but does not return home as ordered. Instead, looking back at us across his shoulder, he makes off into the forest. His mischievous glance from the bushes makes it clear that he won't be going home just yet.

We make ourselves a little more comfortable, pulling the tent over us to avoid the spray and the wind in our faces. We feel on top of the world. But chatting is out of the question - there is so much noise from the engine, wind and water that we only manage to shout a few short remarks.

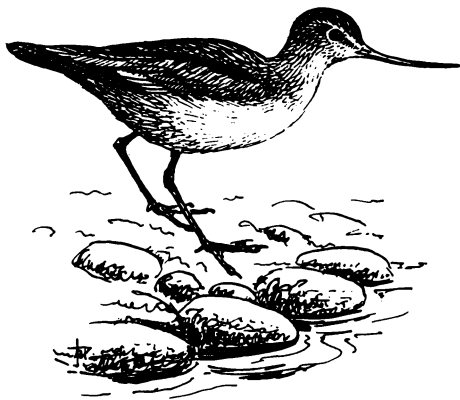
There are not many birds on the river - just common gulls¹⁶, a few species of waders, and the occasional duck. Most abundant are terek sandpipers¹⁷, little snub-nosed waders. Singly or in pairs they run about on shingle banks, feeding and calling with their springtime 'kurryu-u-u-u-...kurryu-u-u-u-...' The call is amazingly loud - audible even over all

WE SET OFF

this racket - and very like the Russian for 'I smoke'¹⁸ (indeed, I wouldn't mind doing just that). When the boat passes close to the shore the sandpipers frequently and anxiously bob with their whole bodies, then give a sharp call and fly off a little way further on.

We go on, and on. It begins to spit with rain. Suddenly Volodya throttles back, steers the boat into an insignificant-looking creek and stops the engine. Sergey and I jump onto the bank, hold the boat and look questioningly at our pilot: surely we can't have arrived?

'She's getting too hot,' he says, motioning towards the engine, 'we'll have to let it cool down a bit.'



It is not such a bad idea - we can stretch our legs. Sergey runs along the bank to warm up. Volodya looks in the engine. I make the painter fast around the nearest bush, then thankfully do a few squats and shake my legs, which have become numb with cold and inactivity. Bird song floats across from the trees. From the nearest birches I hear, one after another, the cheerful songs of a chaffinch¹⁹. But wait a moment ... - chaffinch? We studied all the literature on this area. Here, in the foothills of the Subarctic Urals, there should not be any chaffinches! It seems the early spring has brought them this far north. Here is our first ornithological discovery. I reach into my pocket for the notebook.

Meanwhile the engine has cooled down sufficiently and we go on. Soon we reach the Syvyu. Its current is even stronger than the Kozhim's. In the narrower places the water piles up into a hunchback wave, while below the cliffs there is a threatening, roaring bank of water. But the engine performs magnificently, and Volodya knows how to handle these rivers at this time of year. We forge ahead without mishap, albeit slowly.

Now we scan the banks with more concentration, since it is about time we chose a site for our field work. This stretch seems suitable. With some difficulty we find a place where the current will allow us to moor. Volodya waits patiently while Sergey and I inspect the area.

Yes, we shall stop here. Already several willow warblers are singing on the edge of a clearing, confirming that it is a good choice.

ONE SEASON

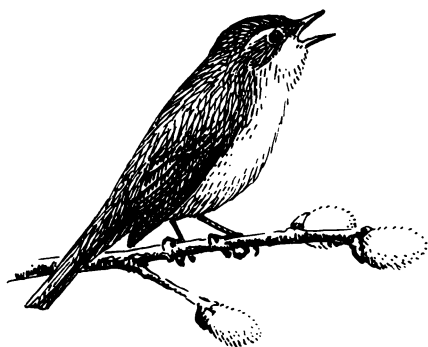
Unloading - campfire - a quick brew-up. Then it is time to say good-bye to our benefactor. After its rest the engine roars into life. We push off the unloaded boat. It turns and gracefully speeds away, bow high out of the water. For some time we hear its roar dying away, sometimes muffled but the next moment amplified by the echo off cliffs and steep slopes.

The rain comes on more strongly. It is becoming a little unpleasant, but we don't feel like putting up the tent just yet. Instead we just use it to cover the baggage. We are impatient to explore the forest, which we already feel is 'ours'.

Immediately upstream there begins a narrow floodplain with attractive and varied woodland, beds of willow, and patches of short grassland and tussocky bog. At the edge of the floodplain rises a steep slope covered in tall mixed forest, undergrowth, bushes and tiny clearings. Once more we feel that we have chosen an excellent spot.

Altogether we have come eighteen kilometres, as the crow flies, from the settlement and the railway, and have ascended only very slightly into the hills. Even so we notice a difference in how well advanced spring is. Here the snow has only half gone, and there is no trace of leaves on the trees.

We complete our unhurried perambulation through the forest, choosing the future study area on which we shall be working for the whole season. We take pains over selecting a campsite. Sergey stays to put up the tent while I return once more to the study area to have a look at the warblers. For the moment we don't need to do much - just observe what the birds are doing.



3. TERRITORIALITY

ЧТО ТАКОЕ ТЕРРИТОРИАЛЬНОСТЬ

It is time to explain in a little more detail precisely which aspects of warbler behaviour interest us.

As long ago as the last century it was first mentioned in the zoological literature that birds have special behaviour for defending the area they live in. Somewhat later there appeared the technical terms 'territory' and 'territoriality'. The territory is the area a bird defends by driving off other members of the same species.

Take the farmyard cock. It certainly does not crow in order to herald the dawn or drive away evil spirits. Its free and easy 'kukarekoo'¹ is at one and the same time a nameplate and an invisible fence recognisable to all other cocks. These 'fences' erected by the cocks do not necessarily coincide with the physical fences between neighbouring yards. The cock's crow is its way of informing all its neighbours and potential rivals that 'I'm boss around here'. On its own ground even a miserable bedraggled little cockerel will drive off any magnificent neighbouring cock that dares to encroach. A cock in its own yard is master of its territory.

The cock's zealous defence of its yard, its expulsion of neighbouring cocks, fights if they occur, the crowing as a means of advertising the territory - these are all forms of behaviour which ornithologists and ethologists (zoologists who study animals' behaviour) describe as territorial. Such territoriality is more closely associated with males than with females, but species vary and sometimes it is the other way around. Territoriality is shown not only by birds but also by crabs, insects, fish, mammals and many other animals. But here we are concerned with birds, and so shall resist the temptation to get diverted.

Why do birds need territories? There are various theories. The first to gain currency among scientists was that the territory represents a stock of food, and so the male must defend it in order to feed himself, his mate and their offspring. The female builds her nest in the male's territory, so territoriality also involves defence of the nest site. There are for instance colonial species such as rooks, sand martins, guillemots and penguins whose territories are minuscule, comprising no more than the nest itself and a tiny area around it. There is no food in such territories, and the birds feed outside them.

It sometimes happens that in suitable habitats there are not enough places for all the males. Those who do not manage to fix themselves up with a territory may try to squeeze in between others' territories, and by

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fighting win the right to some space. Sometimes they are successful. If not they either settle in a rather unsuitable habitat or remain homeless vagrants. These unsuccessful birds usually do not nest at all. However not many cases have so far been discovered in which there are such surplus males: the great tit and chaffinch are two examples, and there are a few others. It is still not known whether this is a widespread and regular occurrence, or on the contrary rather uncommon.

Studies of many territorial species have revealed a variety of unusual and interesting features. The behaviour of any given species needs to be observed thoroughly to establish the general pattern and the reasons for any particular features.

As far as is known to our present colleagues and to earlier ornithologists who have studied warblers, these birds are classically territorial: each male sings on its territory and drives away all other males of the same species. Here the female builds the nest and here the pair feed themselves and their nestlings.

That can be taken as fact. But it is not entirely convincing; it is all too generalised. Ornithologists have done very little work on warblers marked to make them individually recognisable. And you just try sorting out which one is singing where, and which is collecting food, when they all look the same. In warblers the males and females are identical too. It is not even known whether there are upper and lower limits to territory size. Can a territory be very large? And how small can it be squeezed down to when new males are inserting themselves between others? Are there 'surplus' individuals among warblers?

The question of 'surplus' birds is important. If territorial behaviour leads to some individuals not nesting, then it can itself be considered a mechanism for regulating population size and limiting reproduction so that overpopulation is avoided. Mechanisms controlling demographic processes form a significant part of ecology - population ecology. Studies in this field are not only theoretical: they give guidance in the rational control of hunting and fishing, in plant and animal acclimatisation, and in the battle against agricultural pests and infectious diseases. There are general laws regulating the populations of the most diverse organisms. By studying mice we can better understand how elks live; experiments with insects in milk bottles help us manage fisheries.

Research into the territorial behaviour of various animals, including birds, gives clues to the mechanisms which govern the spatial structure and size of populations. This behaviour also determines animals' dispersal and their occupation of new areas - and, on the other hand,

TERRITORIALITY

their concentration in comparatively small areas when others entirely suitable for the species remain unoccupied.

So territoriality is behaviour involving the defence of a territory from others of the same species. A cock will not drive a goose out of its yard and will not run away from it, just as a chaffinch will defend its patch of woodland from other chaffinches while paying no attention to tits, flycatchers, buntings and all the other birds living in the same wood. All the same it does sometimes happen that a male will drive out of its territory males not only of its own species but also of another. This is known as interspecific (between species) territoriality, in contrast to the intraspecific kind (within one species) discussed above. Interspecific territoriality is something we shall return to later.

On our study area - which we usually call the 'plot' - about ten willow warblers are singing lustily and occasionally chasing each other. Our arrival was only slightly late. Taking everything into account they seem to have flown in only very recently, and have not yet managed to fix their territorial boundaries. Evidence for this is seen in the general muddle, the frequent chases and fights. There are no willow warblers in the high forest; they are only present on the flood plain where there is more light, with glades and marginal woodland. This is the willow warblers' favourite habitat for nesting.

A camp fire and a tent - two signs of an expedition in good shape. It already feels like home. Sergey is still chopping something with the axe. There are the smells of smoke and something bubbling away in the huge pot, which has not yet had time to become blackened with smoke. I'm certainly famished! - even more, could do with a good sleep. I sit down by the fire and try to calculate how long it has been since we last slept. That was when we were still on the train. It's incredible: it was over forty-one hours ago.

'My God!' - Sergey clasps his head in a tragic pose - 'It is pure masochism! Poor us - unhappy victims of merciless science! You cruel slavedriver!' - he turns on me, denouncing me as official leader of our expedition - 'You are not safeguarding the health of the masses! You will not be spared their just retribution!'

We stand in the smoke of the camp fire and pull silly faces as if under great suffering. Then we laugh happily. How good it is to be here at last.

4. NEW BIRDS, NEW SONGS НОВЫЕ ПТИЦЫ, НОВЫЕ ПЕСНИ

After fifteen hours of deep sleep, we wake up feeling as serene as the cloudless sky overhead. And all around there are birds - so many birds - singing as if possessed.

We make our way to the plot to catch up on the work that needs doing. Sergey sets the nets while I hastily use three sticks to make a large letter 'A' with a two-metre span. I pin a sheet of paper to the plane table and begin to make a map of the plot, marking various reference points with numbered red labels. I envy Sergey: catching birds is a good deal more interesting than plotting points with a compass by intersection and measuring the forest with the *sazhen*¹, which keeps getting caught on the bushes. Admittedly Sergey is not just sitting around waiting for birds to get caught. He will be visiting the nets every half hour, and between whiles will fit out the camp.

Following one sight line takes me right to the nets. Sergey has only just passed me on his way back to the camp, shaking his head in response to my 'Anything?' But just here a willow warbler is already hanging quietly in the pocket of the net. The first catch of the season! Even so it has already managed to get thoroughly entangled. Following the accepted procedure I first free the wings, then the head, and finally the legs. My heart is pounding anxiously - after all this is the first one. By one of the net poles I find a bag containing the rings. I feel I'd like to mark the occasion in some way, but the order in which birds are to be ringed has already been noted down in both our notebooks. On one leg I fix a standard aluminium ring bearing a number: this comes from the Ringing Centre in Moscow². The other leg receives a similar ring, but one of our own homemade ones, without a number. Using barely perceptible clues known only to ornithologists, I determine the sex: it is a male. Once freed the bird quickly disappears into the nearest spruce trees. From now on he will be known as AA - 'aluminium-aluminium'. I leave a note for Sergey in the bag of rings, to warn him not to mark another bird in the same way.

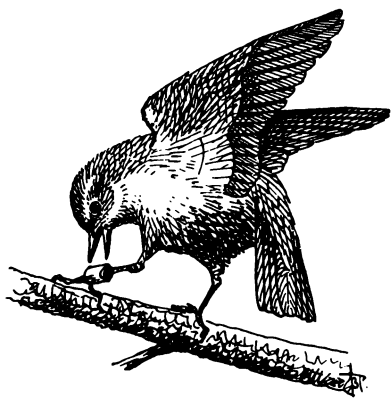
I should dearly love to wait by the nets, but I suppress my excitement, take up the *sazhen* once more, return to the nearest numbered point and resume the measuring. Once more it brings me past the nets, which I examine hopefully, catching myself looking for some excuse to be distracted from my work. But no, this time they are empty. With enormous self-discipline I restrain myself from running around the other nets which ought to be somewhere close by. The mapping of the

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plot must be done as quickly as possible. Even so I yet again find myself by the nets, ring some new captives and grant them their freedom. They include not only warblers but also bluethroats³, bramblings⁴ and little buntings⁵. Every one is given an individual ring combination; these species will not receive the same serious attention as will the warblers, but it is nonetheless quite possible that we shall incidentally learn something of interest about them.

By checking the nets after Sergey I am strictly speaking poaching, stealing the pleasure of retrieving the bag for myself. But I have some justification: the birds ought to remain as short a time as possible in the nets, to keep extraneous influences on them (in other words, ours) to a minimum.

It is interesting to observe a bird that has just been ringed. Even within one species the reactions can be quite diverse. Some individuals are entirely indifferent to their new shackles: they peck at them once or twice, shake themselves, preen a little, and straight away begin to sing. Others though are highly indignant: they pull at the ring with their bills, jerk their legs around and fly away from the place where the strange shiny object is, then alighting on another twig discover to their surprise that the thing is still there. It is not easy to fly away from your own legs. But even the birds who are most put out soon become used to the rings and life with all its cares goes on as before.



In the evening we prepare a meal. The camp already looks lived in, with each tent in its proper place. One with a hole at the top has a stove pipe sticking out of it and pointing skywards, at only a very slight slant. This is the hub of the camp - the kitchen, which doubles as a dining room in bad weather. Here beside the stove stands a simple yet very important piece of equipment made from sticks - a *sushilka*⁶ for drying clothes and footwear. Our expedition boxes are arranged so that two serve as seats and the largest as a table. This tent is not only for all domestic chores and a place for relaxation, but is also our field laboratory and workshop.

We sleep in another tent. It has ample beds, but no stove. There is no need for one if we have warm sleeping bags. Mosquito nets hang over

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the beds. The third and smallest tent is a store for provisions and certain other things which are not needed so much that they must always be to hand in the work tent. In our improvised meteorological station under a spruce hangs an ordinary thermometer of the kind you might have in your window, and there is also a thermograph quietly ticking away and keeping an automatic record of the air temperature. I think we can claim that all essential services and utilities are now installed.

In the night it is clear, calm, and minus four. The diurnal birds have fallen silent and only the thrushes are singing. In middle latitudes they sing most actively at dawn but here, where evening gradually merges into morning, they sing most in the middle of the night. Directly over our tents a redwing⁷ loudly and irritatingly nags away. It is answered on various sides by others; there are quite a few of them. From not far off there come to us the unhurried, thoughtful-sounding phrases of a song thrush⁸. Occasionally the shrill alarm call of a fieldfare⁹ bursts out above the other songs. Among the equally enthusiastic participants in the nocturnal choir are those smaller relatives of the thrushes, the bluethroats.

Occasionally a woodcock¹⁰ can be heard. The bird with its amazingly long bill flies past over the trees in its spring nuptial flight or roding. Among Russian hunters the mating display is known as *tyaga*. It occurs mainly at dusk, but also sometimes in the early morning when there is hardly any light. Here, though, around our camp the woodcock keep roding all night.

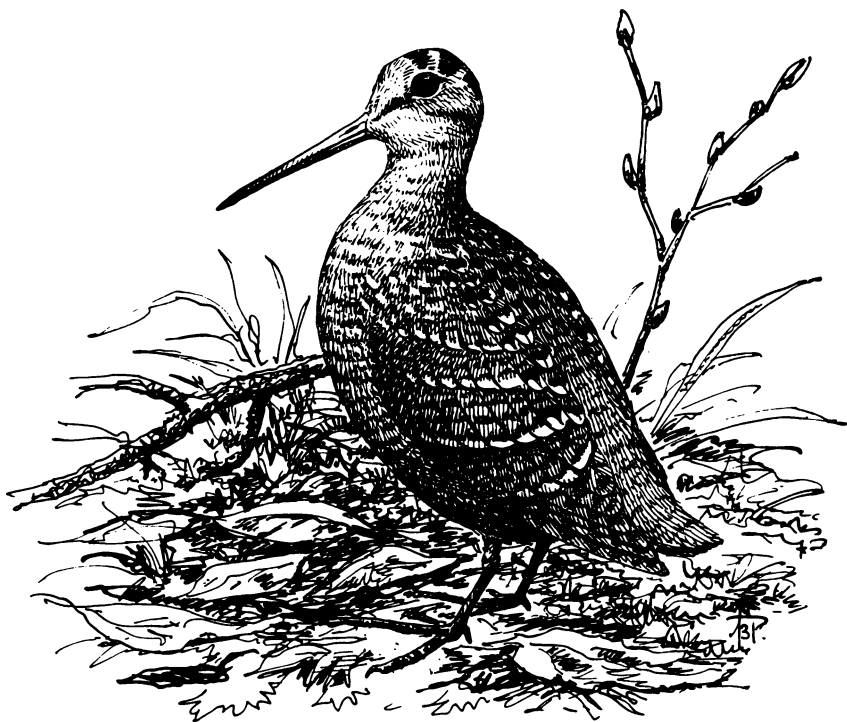
Once I too followed the *tyaga* and hunted woodcock. But then spring hunting was banned. I was still in my teens and loved hunting, so - like many other hunters - I felt the ban was a catastrophe. I only later realised that the spring hunting was not entirely sensible, and indeed in most cases indefensible. When it was banned, for consolation I took to going into the forest just to watch and listen, to enjoy nature for its own sake. This was evidently one of the main influences which led me into ornithology.

Seeing roding every spring I sometimes play a simple trick on the woodcock. It is well known to hunters. If you throw a cap up into the air a woodcock in flight some way off might approach and even settle. He takes the cap for a female. So here I am, going off a little way from the fire, choosing a clearing, and standing at its edge among the spruce. I have to wait a long time. It seems as if there are two or three flying around quite near us, but in fact it is just a single bird. True, the wait is far from boring: I listen to the thrushes and make out variants in their

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songs, comparing one with another. Not far from the spruces another representative of the thrush family strikes up - a redstart¹¹. Here the species is rare, although further south it is quite common in woods, gardens, and even towns so long as there are even just small parks. There the redstarts are the first to sing among the diurnal birds, at the very first light of dawn.

At intervals woodcock fly past some way off, out of sight and scarcely audible. Now though the 'khrrr-khrrr-khr-khr, tsik-tsik' is clearly coming nearer, and when the bird makes its appearance only about thirty metres away I throw my cap into the clearing from behind the spruce trees. It flies up in an arc and lands not far off in the grass. The



woodcock goes into a sharp dive and lands right there, no more than a metre from the cap. I am already prepared with binoculars and study its big black expressive eyes and the beautiful patterning on its back, made up of brown, rufous and straw-coloured blotches which blend perfectly into the background of faded plants and last year's leaves. If you take your eye off it you'll never find the bird again in all that mottled vegetation.

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At first the woodcock stays quite still, then it slowly begins to look around, several times performing a comical movement in which its head moves up and down as if on a telescopic neck. The bird is not at all interested in the cap. It pretends to feed - poking the soil with its long bill at random several times directly in front of it - and then takes off, flying away in the direction from which it was lured.

I return to the dying fire, where Sergey is sitting. When I have warmed up we go into the tent. The thrush songs and the occasional cries of the woodcock have already become our lullaby.

The next day it immediately strikes the eye, or to be more precise the ear, that the willow warblers are more numerous. They are singing not only on the floodplain but also in the high forest where even yesterday there were none. Of the eighteen males ringed yesterday I find ten on the plot, all on the floodplain. The others were evidently flying through and did not stop. Only unringed birds are singing in the high forest adjacent to the floodplain. Things are going not at all badly. It is clear that a new wave of birds has flown in. The newly arrived males have not yet found places on the much sought after floodplain and have occupied the less suitable habitat.

And here is another interesting detail. The nets stand on a small patch, just half a hectare, where only two birds are now singing, yet we caught and ringed even some birds whose territories are half a kilometre from the nets. It means that yesterday they were all evidently flying through our plot repeatedly in different directions. The world of the male willow warbler is not limited to his own territory, but extends much wider. It may be that they are doing their best to investigate the environs of their territories. Is this perhaps a behavioural peculiarity of this early stage in their settled life? It is easy enough to explain: from the very beginning it makes sense to become acquainted with conditions in the area where the whole summer will be spent. It is clearly due to this desire of the males to visit every nook and cranny that we managed to catch so many yesterday.

I still feel one frustration: already so many birds have been individually marked that we could simply settle down and follow the lives of all of them as individuals, observing how they behave when visiting each other's territories and reacting towards newcomers. We would need only to sit down and watch, but the plot is still not ready for serious work. For some time already I have been cursing the early spring and our late arrival as I rush about the plot wielding the *sazhen*, feverishly

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mapping bushes and clearings, and hanging up new numbered labels. I dearly want to have done with this surveying as soon as possible. The cartography is proceeding much more slowly than yesterday, since I must always have half an eye or ear on the warblers to note anything unusual, so as not to miss anything important. There will be no chance to ask for an encore.

Now and then I hear a characteristic 'chazhzhzh-chazhzhzh ...' This is the sound a male willow warbler makes when threatening a rival. At the same time it adopts a characteristic posture: the head, turned towards the opponent, is drawn into the shoulders, the wings are half open and slightly raised while anxiously twitching, and the little bird constantly twists back and forth on its twig, now slightly to the left and now slightly to the right. When I hear 'chazhzhzh-chazhzhzh' I abandon everything, seize the binoculars which are to hand, and try to see where the threat call is coming from. If possible the rings (if any) on the bird must be noted, though more often than not they cannot be seen: either the conflict rapidly fizzles out, or the threat turns into a chase in which one bird dashes after the other through the vegetation, or they perch in awkward positions so that the legs are hidden. Besides, the rings on such small legs are themselves tiny, and difficult to make out from a distance. Of course the birds cannot be decked out with flags on their legs, or ribbons - like a favourite pussy cat! One has to observe the principle of minimal interference, and at the same time suffer the inconvenience that principle entails.

When both participants are recognised, or at least one of them, informative observations are often made. For instance, time after time we see a ringed male driving off an unringed pretender to the territory.

Warblers are attractive creatures to study. They show scarcely any fear of us, especially when sorting out their relationships with each other. Even the ringed individuals bear no grudge against us and do not shy away, despite having been in our hands and experienced perhaps not the pleasantest minutes of their lives while we were disentangling and ringing them.

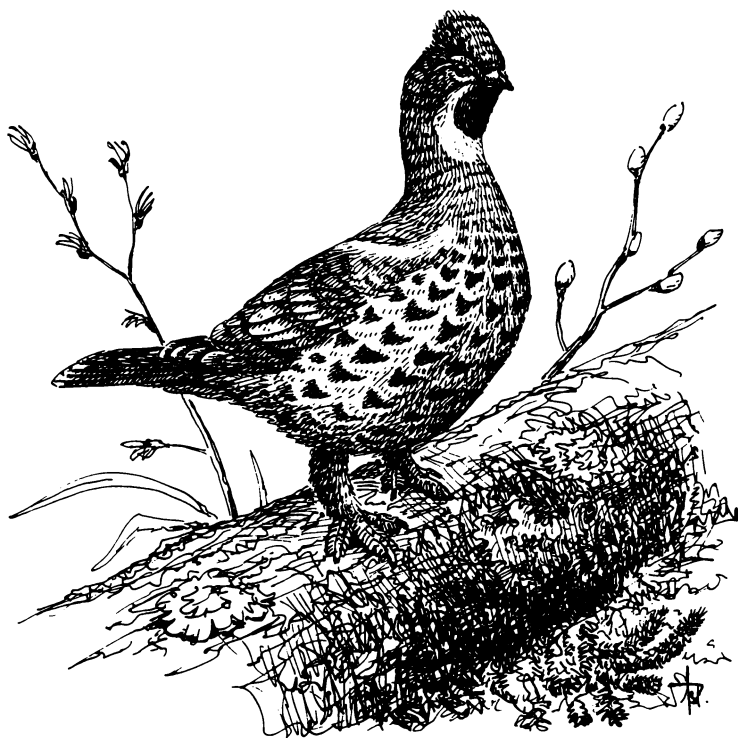
When a new night of twilight sets in the warblers fall silent, internecine strife ceases, and my mapping of the plot proceeds much more peacefully and quickly.

Towards morning a new bird appears near the tents - a black-throated thrush¹². We listen to its unique song; and not only that, we take pleasure in unhurriedly incorporating it into the sound archive each of us carries in his head. For us it is a completely new sound, resembling yet at the

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same time different from other thrush songs. It takes some time, or more accurately a certain number of repetitions, before we can say we really know it and it is instantly recognisable. During these hours the other sounds are for us merely an accompaniment to the solo performance of the new thrush.

Suddenly our concentration is disturbed by the thin whistle of a hazelhen¹³ - another new sound for us in these parts. Sergey fishes out a hunter's whistle from somewhere and answers the hazelhen with a similar warbling trill. We hear a tight 'prrrr' of small strong wings and here, right beside the tents, is a hazelhen, pacing about and peering into the bushes and windfallen branches. It has a black throat, so it is a male. It is clearly searching for a female. Sergey has simply conned it - a gross and cynical deception. There is no female, but Sergey's warble on the whistle was like a female's song, and so here it searches. For the hazelhen we simply do not exist; we are just stumps. We sit by the fire and talk in a whisper. Meanwhile he paces back and forth, jumps up onto the fallen branches, stops as if deep in thought, fluffs up his



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feathers, throws back his head onto his back, opens his bill wide as if about to call loudly, but only gives out the same thin little whistle, and then resumes his pacing.

Hazelhens pair in autumn or early spring, and then stay put in one area. Evidently our bird has remained single, and so has been wandering up to now. There are few hazelhens hereabouts and it will not be easy for him to find a mate. Eventually he makes off on foot towards the hills, alone and disappointed. We hoped that we would come across him again, but we never did. We saw no other hazelhen here the whole summer.

5. NO MAN'S LAND?

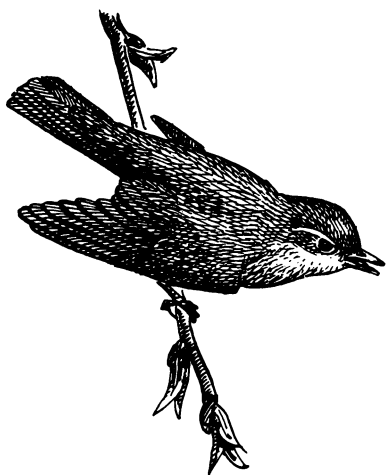
НЕЙТРАЛЬНАЯ ПОЛОСА - ЧЬЯ ОНА?

At long last the surveying is complete and I can make a start on mapping the territories. In studying territorial relationships it is important to know the exact area held by each male.

I begin with Azhik. He sings at the edge of the plot. His name comes from his personal code 'AZh', meaning *alyuminiyevo-zhelty* [aluminium-yellow], or to be more exact left-aluminium, right-yellow. The ring code reads from left to right (when there is one ring on each leg) and from top down (with two rings on one leg), as when reading a book. In the early stages we can get by with a small number of rings. If the different one- and two-ring arrangements do not stretch far enough, we start giving each bird three rings. These combinations are more difficult to read, however, and the codes correspondingly more unwieldy, consisting of five letters. It will be a relief if this season we can manage with no more than two rings per bird.

The procedure for mapping a territory is not particularly complicated. On the plan I must plot each point where Azhik sings, noting its position from the distance and direction to the nearest numbered label hanging on a tree or bush. Then Azhik's territory is the area within the outermost points. After Azhik I tackle his neighbour, and eventually all the birds singing on the plot.

It is not easy working on Azhik's territory. The greater part of it is occupied by dense willows, making it difficult to see the numbered labels - even though they are bright red and even with binoculars. I have to follow close on the heels of the songster. It soon becomes all too clear that he is far more agile than I am. Flitting nimbly from one bush to the next, Azhik sings out his claim to a large patch of scrub in just thirty



seconds. When he goes off some way I follow, looking around for labels and continually stumbling over obstacles hidden by water and melting snow. Squelching through the snow *kasha*¹, I force my way through the ingeniously interwoven willow branches. There can be no doubt that the Creator, when he designed this thicket, was moved by the prankster's delight in sabotage. After the assault course through the willows I sink down on a mound, a little higher and so a little drier than everything else, to get my breath back, and only then start searching for Azhik, who has meanwhile

slipped away. When I find him at last I have to check from his rings that it is indeed he.

Once Azhik's territory is plotted in outline I move on to his neighbour Pyzhik² (PZh - *pravo-zhelty*) [right-yellow]. It is much easier getting around in his domain, but he himself is very restless, and sings somehow unevenly. First he dithers around on one tree, then suddenly breaks off and flies away to the other end of the territory. There he might sing through just one or two songs before straightway flying on again somewhere else. Pyzhik loves making clandestine raids into neighbouring territories, and often it takes a long time to find him. Sergey has to disentangle him repeatedly from nets put up in various parts of the plot.

So as not to waste time while Pyzhik is off on some excursion I map his neighbours' territories. Now and then I go back to Azhik to plot his boundary more exactly, then return once again to Pyzhik and his neighbours. Gradually I am memorising the numbers on the labels near where the males sing most often, in other words near their favourite songposts. That means I don't need to run around so much looking for labels and can economise on effort.

Little by little a general picture of the territories emerges. Nowhere on the plan do the polygonal shapes touch each other. Between neighbouring territories there always turns out to be a sort of no-man's-land where neither warbler sings.

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Somehow up to now I have never given any thought to the existence of this neutral zone. And now I see a question being answered that so far I have never managed to ask myself.

The familiar 'chazhzhzh-chazhzhzh...' attracts my attention. I find Azhik and Pyzhik just at the edges of their no-man's-land. Both are perched on birch twigs and strenuously displaying to each other. Apparently neither is encroaching on the territory of the other, yet neither seems to trust the other that much either. They are reminding each other of their rights, rather like shaking their fists. Soon the threat displays come to an end and the neighbours sit quietly in the same places, glaring at one another. I wait for them to fly off before continuing to shadow Pyzhik.

Quite unexpectedly a warbler begins singing quietly in the neutral zone not far from me. Pyzhik is the first to react. He resolutely dives down - enough for the newcomer to take flight. Azhik joins in the chase. No longer calling, the three birds fling themselves onto the ground, their little wings making such a racket that one might think someone were lashing the bushes with a birch rod. The newcomer is in a tight spot. He would clearly be glad to slip away somewhere unnoticed, but his aggressive persecutors give him no chance to collect his wits and orientate himself. Neither of them had been able to express his worked up feelings against the other, and both seem pleased to have found a scapegoat. One moment the noisy chase is confined to the neutral zone, the next it has moved to Azhik's or Pyzhik's territory.

The intruder perches for a moment on a twig, but Pyzhik flies at him violently and knocks him to the ground. This is happening just a few yards from me, and I can clearly see Pyzhik standing on the back of his prostrate opponent and with cold deliberation pecking him - when he is already down - in the back of the head. Half a metre overhead and looking like an irate eagle, with wings half spread, Azhik bobs about on a twig and looks down now with one eye and now with the other. The overthrown invader, whom I am already inclined to regard as a doomed victim of the cruel mob rule of the two far from chivalrous proprietors, suddenly jumps out from under his persecutor and again makes



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a dash for it. The chase circles around me once more, then comes to an abrupt halt. Two warblers sit quietly in the willows - Azhik and Pyzhik. Seemingly disheartened they glance around, then look at each other sheepishly before flying off into their own territories.

Soon their songs reach me from the tops of birch trees. They sound pleased with themselves and full of pride. From the thick yellow herbage below a juniper there comes a rustle, and a warbler emerges. With its flattened feathers, it looks scrawny and miserable. It has no ring. Looking around furtively it steals away, hopping from bush to bush as it makes off on foot, away from this evil place.

The avian dispute was a graphic demonstration that the neutral zone is certainly no no-man's-land. It is guarded by the two neighbours even though, in recognition of an accepted taboo, neither sings in it.

There is evidently a reason for this. If the zone were not protected some sly bird would occupy it and start singing. Then inevitably it would begin to encroach on the adjacent territories. Far better to chase it off right from the start.

In this case though, why not do without the neutral zone altogether? If the neighbouring males divided it in two and sang each in his own half, it would not enter the head of any other male to sing on the very boundary, since it would be immediately obvious that all the land here is occupied and defended. But that does not happen. The neutral zone is clearly needed as a buffer, calming the tension in relations between the neighbours. It is better in fact for them both together to chase off some stupid stranger occasionally than for each constantly to be checking on his neighbour. Otherwise it would be necessary to determine by ear, and from a distance, exactly where the neighbour was singing - beyond the boundary, or perhaps already in one's own territory? Naturally it is easier if the boundary is a broad zone and not just a line³.

It is curious that a similar neutral zone is not a feature of all birds with territorial behaviour. Here are a few examples from my own experience on the tundra. Bluethroats, lovely little birds with large eyes and blue breasts which live in tundra scrub, not only have no neutral zone: they will even sing on a neighbour's territory as a matter of course, although such incursions are considered illegitimate. What matters is that the owner of the territory should be nowhere near. As soon as he appears the transgressor makes for home. As a result of such mutual violations of the boundary the males demonstrate the occupation of the whole area where several individuals are resident. The system is both reliable and understood by outsiders.

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Or take the red-throated pipits⁴, which live on the open tundra. Like other pipits they sing in flight. They are very neighbourly and I have more than once seen two or even three birds with adjacent territories singing side by side without conflict. It is considered no disgrace to sing on your neighbour's territory. If however a strange male attempts to sing nearby on the territory of any one of them, they all promptly drive him off. It was interesting to see how the pipits passed the uninvited guest from one to the other like a relay baton.

Whichever species you consider, each and every one has its individual peculiarities - including in its territorial behaviour. It is not always just the simple formula, 'I live on this territory, I myself advertise it, and I alone defend it.' It is always more complicated than that. These complexities need to be deciphered. It is the usual process in science: from the general to particulars, which are then generalised once more, but this time on a qualitatively new level. And so on *ad infinitum*.

Two days after the border incident involving Azhik and Pyzhik, a similar event took place in a neutral zone. Sergey and I watched it at one of the nets, where we were delighted to find our first capture here at Syvyu of a dandyish male redstart.

It began with an unknown X, an unringed willow warbler, striking up a song in a glade with scattered spruce trees and patches of willows. At this point four neutral zones converge, resulting in a large patch, almost one sixth of a hectare. It seems that the apparent lack of an owner attracted the newcomer to the area. The neighbouring proprietors are the very same Azhik and Pyzhik, and also Zhuzha (Zh-Zh, yellow-yellow) and Koka (K-K, red-red). They all appeared virtually simultaneously, as if they had been waiting in ambush. Of course this wasn't the case, and although each had been occupied doing his own thing he had also been constantly listening for anything happening in his territory and its immediate surroundings. It is amazing how exactly they orientate themselves by ear and how well they know each other's voices and do not rely on external appearance alone.

At once there is a chase. Five warblers flying frantically between the bushes creates an unimaginable din. We manage to follow everything by eye, since it is all happening just in front of us as if on stage. After several seconds of this commotion the newcomer disappears. It is a vanishing trick not only for us but also for the pursuers. There is immediate quiet. All that remains is a little feather slowly sinking through the air in the middle of the glade, rotating as it goes. The warriors silently leave the field of battle. Only Zhuzha does not calm down. He seems to have a

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bellicose character, and is disappointed that there is no-one left to beat up. He is so intent on the search for the invader that he forgets where he is. The others perch at the edge of the neutral zone and watch the preoccupied Zhuzha. Now he in turn infringes the neutral zone's inviolability. Immediately he is no longer an ally, and the other three threateningly posture and call. But Zhuzha fails to understand that these signals are aimed at him instead of against the common enemy whom he is still intent on seeking out.

Now Zhuzha crosses into the territory of Azhik, who immediately switches from vocal threats to direct attack. A new chase ensues. The neutral patch is not large enough for the birds, and the whole lot fly first into one and then into another territory. It turns into a general free-for-all in which it is difficult to make out who is hammering whom. It seems that all discrimination is thrown to the winds, and they are being aggressive just for the sake of it. It is like a drunken brawl.

I can understand it: the original transgressor disappeared so suddenly and gave the others no opportunity to vent their anger. So now they are getting rid of their aggression on no-one in particular. Our warblers are demonstrating a classic form of behaviour which ethologists call 'redirected aggression'. This is seen when an animal has no opportunity to take revenge or give another individual its just desserts. Thus a cock deprived of its rival might for no good reason thrash its own mate, or hurl itself at a car tyre.

Redirected aggression makes its appearance from time to time even among humans. Someone offended by a stronger person might, if not sufficiently self-controlled or well brought up, vent their anger on someone weaker; or a couple angry with each other might smash crockery or break up furniture. So here are our warblers, the cause of their aggression having done a bunk, beginning to beat each other up. And if one of them happens to violate another's territory, then that is just a good excuse to carry on the fight.

Gradually their passions abate. There are parting shots at the boundaries... - and soon all four are singing once more from their favourite song posts.

I notice that all this time I have been holding the ringed redstart: the gripping spectacle had been such a distraction. I release the bird - it has endured enough. We separate to get on with our respective tasks. I've gone only a few yards when Sergey calls, 'Over here! Look at this!'

Going over I see a willow warbler in the net just behind where we had been standing. It is ZhK - Zhak. It seems that we were not the only ones

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wanting to watch such an unusual battle. Zhak, whose territory is at the other end of the plot, was also attracted by the noise. Who knows what he managed to see of the scene being acted out in front of us? Maybe he just wanted to take a look, and immediately found himself netted.

'So, you inquisitive little barbarian,' I address Zhak accusingly while he furiously pecks Sergey's thick finger with his slender bill. Suddenly a wild hypothesis strikes me. I am so taken aback by it that I involuntarily exclaim, and Sergey looks questioningly at me and back at Zhak.

I explain my startling new idea. It could be that Zhak was not being inquisitive at all. What if he had come to lend assistance to Koka, Zhuzha, Azhik and Pyzhik in chasing off the unknown male? It is certainly a bold proposition, for it would mean that willow warblers are quite social animals, that several males with neighbouring territories consider themselves as a single unit, rather like a flock with a common super-territory which they defend jointly as well as each individually. There is no denying that Zhak is a very distant neighbour of the other four.

Sergey and I discuss this new hypothesis for some time, then amicably come to the conclusion: out of the question!

Soon we go our separate ways once more. But we can't forget about it. What if Zhak had not been caught?

I need to go further over to the river to see what is happening to the warblers at that end of the plot. Still impressed by the willow warblers' mass fight I ponder the mystery of Zhak. At the river, where I sit down on a fallen birch to have a smoke, there are noticeable changes. The ferocity of the current has abated somewhat, and the water level is down. Not far from the bank a large rock is emerging from the water - so far the only one in this stretch of the river, beside which is a small level floodplain and gently sloping shore instead of a rocky bank.

Here too willow warblers are singing, and also bluethroats, bramblings and other common birds. But these are not the only ones. Low over the river fly small common sandpipers⁵, uttering their short song like a thin anxious titter. Occasionally there can be seen over the river those beautiful duck, mergansers⁶, or teal⁷, our smallest duck and very charming too. Generally, though, there is little life near the water. Clearly to blame are the rapid current, bare stony bottom, and lack of rich thickets of vegetation. All the same there is something different about this place, compared with the depths of the forest in the parts of

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the plot where we spend most of our time. Here is water, movement, more sky and distant prospects which are pleasing to gaze at. So it is a good spot for a smoke.

This time there is something of interest. On the stone which has only recently emerged from the water alights a dipper⁸ - a unique passerine which lives only by mountain streams and rivers. It is the only passerine which can dive and collect small creatures from the bottom. I have seen dippers only a few times before, and then only briefly. Now I am watching the dumpy bird through binoculars, waiting for it to dive. The dipper runs about on the stone examining it intently, several times picking up something from its surface, and then begins to preen, here and there ruffling up its feathers and performing the most comical and unexpected contortions. After that it very energetically shakes its whole body, gives a short sharp call, and vigorously flies off upstream low over the water. Not once does it dive.

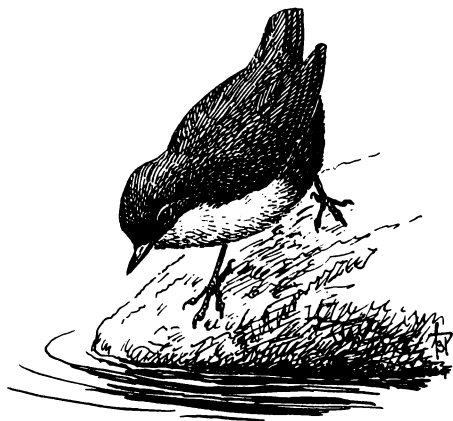
Of course I am a little disappointed, but at the same time pleased at having been able to watch it. There is still the hope that somewhere on our little river we shall eventually see with our own eyes a dipper's nest. As I remember it described in books it should be situated somewhere under overhanging rocks, near roaring water and flying spray, or tucked

behind a waterfall so that to reach it the bird flies straight in, punching its way through the wall of falling water.

There seem to be no waterfalls on our river, but rocks and spray there are aplenty. The nearest cliff is about a kilometre downstream, from where the dipper came. There is also another cliff upstream, towards which the dipper flew away. Of course we shall have to go and search.

Again over the water titters the common sandpiper, which then settles on a twig of a fallen

birch - the one I was sitting on myself. The little wader bobs up and down with its whole body, watching me with its black eye, then realising that I am something large and alive it gives a squeak and flies off. From



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above comes the song of another wader. Having taken off over the birches in a steep climb a green sandpiper⁹ slows down its flight by stretching wide its previously half-opened wings, and sings out its high-pitched and graceful 'tyuulli-tyuulli-tyulli....'

6. GETTING ACQUAINTED, WEDDINGS, SETTING UP HOME

ЗНАКОМСТВА, СВАДЬБЫ, ПЕРВЫЕ ГНЕЗДА

On 25th May I notice on Zhuzha's territory a quiet little warbler without a ring. It is hopping unhurriedly from twig to twig looking for food and seems to be paying no attention to Zhuzha himself. This is a female. He though, with a servile and nasal chirp, is hopping around and vigorously displaying. His movements strongly recall those of males in a conflict situation. Probably the only difference is in the rhythm of the wing flapping and in the accompanying calls.

It seems that the pair first met somewhat earlier. First acquaintance should begin with the male threatening and the female adopting a posture of appeasement - or appropriate vocal signals. According to well established ethological theory this should be followed by an extended getting-acquainted ritual involving the display to each other, in a predetermined sequence, of recognition signals peculiar to the species. Precisely how willow warblers get to know each other is not described in the scientific literature. There are, generally speaking, very few details of this kind. Perhaps in the coming days we shall manage to make some useful observations.

The most important recognition signal is the male's song; it is the main feature of a meeting. I am seeing Zhuzha and his lady friend when courtship is in full swing. In this phase the female remains outwardly indifferent to her admirer while learning to recognise him and getting to know his territory and its environs. According to theory the male's courtship is very important in the physiological preparation of the female for nesting.

But perhaps there is in fact no such ritual at first acquaintance. Is it possible that I am seeing what always happens from the very beginning? Presumably the warblers haven't read the textbooks.

Now and then Zhuzha sings quietly, almost whispering, just for the female. Suddenly and unexpectedly his behaviour changes: he becomes more serious and agitated. He stops prancing around and, drawing his

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head into his shoulders, sits still for some time in one spot, hopping from twig to twig only when the female moves off some distance from him. With great care, so as not to attract the warblers' attention, I examine the nearest numbered red labels and see that the female has led Zhuzha into someone else's domain. Its overlord is singing not far from them - it is Pyzhik. Zhuzha clearly has cold feet and is trying to be as unobtrusive as possible. I wait for the conflict to begin. This is interesting: will Zhuzha make off at the first threat display of the territory owner, as usually happens, or will he come out with some chivalrous behaviour in the presence of the female? And how will she conduct herself - fly off with Zhuzha, or stay with Pyzhik?

However Pyzhik does not notice the quiet pair. He stays where he is, singing away. But Zhuzha should be showing her somehow that they are no longer on his territory. Is his round-shouldered posture itself a signal? In no haste she turns back to Zhuzha's territory, and he follows. Feeling he is back home once more he perks up, flies to the top of a birch and, seemingly from relief, bursts into song at top volume before returning once more to the object of his attention.

Now I notice another warbler, and glance at its rings. It is ZhK - Zhak again! He is an irrepressible voyeur, quite obsessional. Keeping a low profile in a foreign territory he shamelessly stares quietly from low down in a bush at the courtship of Zhuzha and his bride. I don't know whether Zhak makes a careless movement or Zhuzha senses his envious gaze, but the next moment Zhak takes flight - for some reason directly away from his own territory. Meanwhile I lose sight of the female.

From today the lives of our willow warblers take on a new emotional and social complexion. A period of getting to know each other and setting up house together has set in.

Over two days Sergey has been shadowing a female in Azhik's territory carrying bits of vegetation in her bill. This is how the first willow warbler nest was found. It was already a loose little *shalashik*¹ made from herbage in a tuft at the edge of the willows. Sergey immediately started making observations on the nest and set up an activity recorder - a device which electrically records each time the female flies in with nest-building material. The same day Sergey found another nest at the very edge of Pyzhik's territory. Strictly speaking it is not yet a nest, just a depression made by the female in the moss - equivalent to the trench excavated for the foundations of a house.

Nest-finding becomes an ever more consuming interest for us. Already we have been putting a lot of effort into it, not only setting aside

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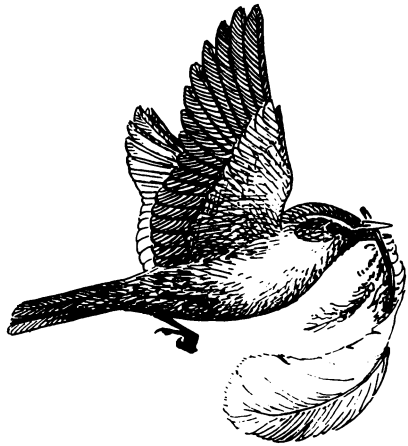
special times but also combining it with other activities. Among our finds are nests of bramblings, cosily constructed in the forks of birch branches or on spruce twigs, and beautifully decorated with lichen and thin strips of birch bark. In the trees we have found several thrush nests - of fieldfares and redwings; they are woven from last year's herbage and smeared with mud for strength.

The black-throated thrushes however built their nest - woven from *Usnea* lichen - almost directly over our tent. We climbed up the tree to look at it almost every day. Of most interest was that at the mud-smearing stage there appeared in it a small spruce cone. This too was smeared with mud, and we gained the impression that the female, in carrying out her intricate potter's craft, rolled the cone around inside the nest. Then the cone disappeared, the mud cup dried out over several days, small bits of dried herbage were inserted as a lining, and finally there appeared grey-blue eggs with reddish flecks. The female brooded the clutch while the male continued his solo concerts, which however became rather infrequent when the female collected grass and lumps of mud from the river: he merely followed her about and gave the appearance of being a complete idler.

For each nest found, whatever bird built it, a filing card is made out with a careful description, a sketch of its construction, a record of its situation on the ground or in a tree, and its measurements. Further notes are added to the card with each later inspection. As each day passes the pile of cards grows ever higher.

It is always a pleasure to find a nest. Each time it is like discovering a bird's little secret. The nest is the hub of the bird family and its holy of holies. We are particularly excited to find the nest of a new species, until then known to us only from an inadequate description in a book. To rephrase a well known saying, seeing something once is better than reading about it a hundred times.

But it is the warblers we have come here for, so their nests are the most popular by far. They are mainly Sergey's province. He makes



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observations, sets up instruments and patiently shadows the non-singing warblers. If he manages to spot a female with herbage or a feather in its bill, the nest is already halfway to being found. It only remains to be particularly gentle in one's movements so as not to scare the bird. Even very careful shadowing can be fraught with unpleasant consequences: the female can easily abandon a nest already started and look for somewhere to build a new one. This behaviour is of course very useful to the bird: if a predator discovers the nest, it could come back and eat the eggs or nestlings. It is better to abandon it while it is still empty.

Most of the birds include us humans in the category of predators. It is quite understandable. All our distant ancestors would have relished the chance to treat themselves to eggs or nestlings, and even now there are quite a few nest destroyers among us. Ancestral instincts are evidently strong. The birds' instincts, on the other hand, are their survival mechanism. Of course they do not know what prompts a human to look at a nest, what governs his behaviour, whether it be inquisitiveness, the desire to push back the frontiers of knowledge, or just plain hunger.

Mostly though they treat us as they would any other large animal. So whatever the situation we must be very cautious where nests are concerned. But each bird is an individual. Take the thrushes: they trust us absolutely. And the willow warblers are not always too fussy, often forgiving us for our carelessness.

A warbler building a nest conducts itself in a very characteristic manner. Flitting like a butterfly just above the ground, it discerningly selects the building material suited to its engineering strategy. Sometimes it seems as though any herbage from anywhere will do, even from just around the nest, but another time the female will fly off a hundred metres, then rummage around, select a piece of plant matter, throw it away, fly to another spot and choose something else.

Often the male accompanies the female on these searches. He does not bother to help collect material or build the nest, but just fusses around aimlessly and even from time to time persistently demands attention from his mate who is already busy enough with her important task.

Occupied with courtship and inspection of the nest-building, the males sing less than before. Even so the forest is still overflowing with the tender songs of the willow warblers - except at night, when there is a break for about three hours. The character of the singing changes when the nesting period starts. Apart from the usual 'standard' song the males now and then indulge in what we call 'broken' songs; these are quieter,

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which makes them seem more affectionate. Straight after one such song, and without the usual pause, a second one follows, even quieter, and perhaps a third, quieter still. These extra songs are incomplete, with the individual phrases somehow strangely prolonged or sometimes, on the contrary, seeming to be 'swallowed'. The whole song is generally sluggish and melancholy. In the mornings though the warblers lustily sing more typically spring songs.

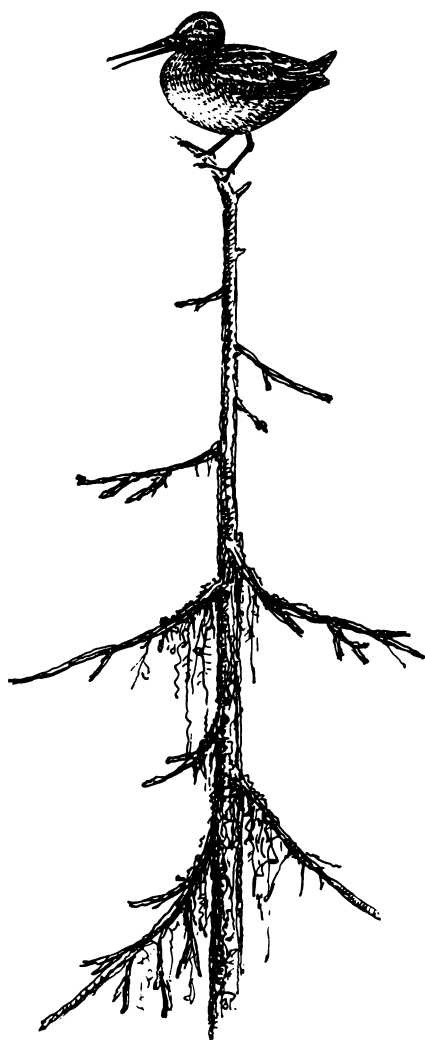
There are often conflicts, when territory holders see off their pushy neighbours. These are usually good natured chases: one flies off, and the other follows close behind. Both the encroacher and the pursuer know their rights and carry out the ritual, all in the day's work.

The territory boundaries which I have plotted on the map are strictly observed. Only Kach (KCh - red-black) and Zhak cannot yet decide how to share out the edge of the willow marsh. Sometimes they spend a long time pulling faces at each other and then, agreeing that here is the neutral zone, they fly off. But only an hour later one of them, usually Zhak, breaks the agreement and starts singing in the disputed willows. Once more there are threats, concessions, a brief truce. It goes on for almost a week. These gnarled trees have become an obsession with them.

Fights also occur, involving unringed males, although they are invariably defeated. These are birds hoping even now to secure a place in the sun, which means acquiring their own territory.

All night and in the morning of 29th May we hear overhead in the murky low cloud the whistle of wings and a characteristic 'tyuk-tyuk' call. They come from skein after skein of large, bluish-black duck - common scoter² - flying north-east. They remind us that somewhere, not so far away, on the tundra too spring is beginning. This time it is starting without us.

For some time a vague anxiety has been stirring within me. It is probably the feeling that we have not yet completed our own journey; as if someone has prevented us reaching the place where we make every effort to arrive every spring, year after year, like migrating birds. I have been trying to understand what is missing in my life here, apart from the wide open sky, the expansive horizon, the tundra itself and the tundra birds. Perhaps it is the exposure and lack of shelter, the penetrating wind, the bleakness. Yes, that's it: I miss the bleakness which has accompanied our field work, wherever it has been carried out in recent years. So, I have found something to regret. Is the forest really too



comfortable to be taken seriously? No indeed, the forest is far from being a carefree paradise.

Another strange quirk of our psychology.

Very soon spring will be over. Already the snow has gone, even in the mountain clefts. The grey slopes, with dark patches of spruce, seem to be dusted with a pale grey-green mould - the new foliage. Wisps of fresh herbage appear in the meadows. The round hard shoots of false hellebore³ confidently punch their way through the soil, like those missile-shaped fossils called belemnites.

Asian snipe⁴ have arrived. We shall now be hearing their mating calls and drumming right through to mid-July. This snipe produces a remarkable sound. I remember when I first heard it; I even crouched in surprise, since it seemed to be no bird but a small jet plane roaring past directly above my head, prompting me to cover it with my hands. The flying bird gradually climbs, then plunges into a steep dive, just like

the common snipe which country people call the *nebesny barashek* [sky lamb] on account of the bleating sound it makes. The Asian snipe climbs higher and does a much lower dive, hence the noise, which is entirely unbird-like, but decisive and ruthless. The bird itself, on the other hand, is retiring and attractive. On its mating grounds there are, besides the jet plane buzzing, other much more pleasant sounds, rather like a rhythmical loud whisper. The Asian snipe can 'whisper' not only in flight but also sitting on the ground or perched in the top of a tree.

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Cuckoos⁵ can be heard almost constantly. Usually it is the traditional 'cu-cu' of the males, but sometimes the females produce a high-pitched gurgling warble. Occasionally the cuckoos organise wild concerts in which, besides the incessant 'cu-cu's and gurgling, one can hear gloomy hooting interspersed with a sound which could be a wood-goblin's laugh, rather like a vulgar belly laugh. The male oriental cuckoos⁶ call their monotonous and despondent 'pu-pu-pu-pu'. This is a different bird, although closely related. It gets its Russian name '*glukhaya kukushka*' from its muffled and indistinct voice.

1st June - the start of summer - but we greet it in tedious rain which is spring's legacy to us. It started on 29th May and has hardly let up. It is so dark all the time now that even the woodcock, birds of the twilight, are roding all day. On the drum of the thermograph a practically level line has been drawn now for three days between two and four degrees Celsius.

So sodden is the forest that waterproofs are no use at all. However carefully you look after your binoculars they inevitably get spattered, the eyepieces quickly steam up from the warm vapour from your eyes, and you wander through the forest half blind and effectively binocularless.

The raw weather frequently drives us back to the tent to dry out. We occupy ourselves with filing cards and tracing paper, sew on buttons and patch up the holes in our boots made by branch stumps on fallen trees. From spruce blocks we make a stout table to set near the campfire, and erect a polythene awning for the firewood. Then we construct a sawing horse for cutting logs. The stock of firewood also constantly needs replenishing, which means seeking out dead wood, sawing it into lengths which the two of us can manage without straining ourselves, then dragging them back to camp. There they are sawn into blocks, chopped, and stacked under the awning.

All these tasks we endeavour to carry out on days when the weather prevents any work. But now we have had quite enough of it. The problem is, we are almost in the mountains. The rainclouds sail across the European plain from the far-off Atlantic and then are caught on the cold mountains. Hence, no shortage of rain. It is great weather for turning into an alcoholic. Thank goodness the tent does not leak and the sleeping bags are warm.

During all these late May and early June days we are waiting in expectation. No, not just for better weather. We are looking forward to seeing the arctic warblers. We know they are behind schedule, yet they

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seem now to be altogether too late. Already everything else has flown in that ought to fly in, and even some we were not expecting - birds which the unusually early spring has evidently brought this far north, such as chaffinches, yellow hammers⁷, siskins⁸ and Blyth's reed warblers⁹. But of arctic warblers - not a squeak.

During one rainy night in early June we set out to walk around locally - nest hunting. We call this 'spontaneous hunting'. It involves wandering wherever takes our fancy, just like being on holiday. The raw weather is not so unpleasant if you know that over there, close by, are the tent and a warm stove. And the cold has one thing to recommend it - there are no mosquitoes. This time we have in mind just one place to visit: Sergey is going to show me a dipper's nest which he has found recently. There is some mystery about this nest, but what he won't say.

When we arrive at the cliff and Sergey says that the nest is within ten metres of me, I begin to scan the rock wall over the water. It is not difficult since here there is a gentle slope down to the river, while out of the water project boulders on which I can stand to examine the whole rock exposure. It is rather like a river embankment you might find in a town, three to four metres high and about twenty metres long. At one end it merges into the gentle bank and at the other turns into the cliff itself which hangs over the water as a great crag. We have already named it Dipper Rock¹⁰, following the custom of giving the name 'rock' to similar crags and cliffs on river banks in the Urals.

The rock wall in front of me is quite bare, covered only patchily with lichens and small cushions of moss, while herbage pokes up here and there. Above the water and in it are water plants, like mermaids' hair (an idea which has no doubt occurred to many others besides myself). Higher up at the edge of the rock, bushes are growing out of cracks, and beyond that begins the unbroken forest of large birches and dense young spruce thickets.

Realising that the nest cannot be hidden anywhere at all on the rock face, I begin to look at the cliff hanging over the black whirlpool. On the cliff are many small recesses where I can easily imagine a dipper's nest could be concealed. But it is not to be seen. The sky is overcast and rather dark - after all it is night, albeit a 'white' one¹¹; or to be more precise a grey one.

'I said not more than ten metres,' says Sergey, bringing my search to a halt, and with a grin glances upwards, meaning that maybe I should be looking up the-e-e-e-re.

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Sergey has a good eye, and he is precise. If he says 'ten' he means it. I willingly play the game and mentally draw around myself a sphere with a diameter of ten metres, or maybe eleven to be safe. Once more I search the rock wall, starting at the very foot. I even glance behind, which brings a smile to Sergey's face, for behind there is nothing but water. On the rock surface there are only the same water plants, herbage, moss, lichens, and at the top bushes. Now I turn my attention not to the rocks but to everything else. There is a small patch of bare bank covered only in herbage. I go over, but there are no tufts or holes. Once more Sergey grins. But when I approach the spruce trees I see in his eyes that I am getting warm. Suddenly a dipper appears from a cleverly woven construction of needles and branches, and slipping past almost under my arm falls like a stone down to the water, then quickly and silently flies off behind the cliff.



The nest is not particularly well camouflaged. It is set among the thin twigs of a spruce standing on the edge of the rock and looks like a sphere about the size of a basketball. It is made mainly from moss, and the entrance is a small hole at the side. Inside gleam five eggs.

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‘I searched for it in just the same way,’ said Sergey. ‘It flew out from somewhere. I searched the stones almost inch by inch, then went away, hid - and it flew into the spruce’.

Thus are stereotypes shattered. Somehow it had become engraved in my memory that dipper nests are unfailingly on cliffs, directly above water, preferably beside a waterfall or near spray. And only now do I recall reading somewhere that their nests can also be found in trees, just like those of many other birds. But that had slipped my mind, and I remembered only the image which was most striking. Moreover dippers feed not only under water but also just running around on the bank - not so interesting. Then again, this bird is quite unlike ordinary diving birds, yet it dives - and that we remember.

We cannot stop examining the nest. It's true, we are relishing it. It is a really new, rare and wonderful experience. Such finds are remembered till the day you die. Certainly many other nests stick in the memory, almost all that you find yourself, even if they number hundreds or thousands. In our work each discovery of a nest leaves its emotional mark. But this nest is something quite apart.

Next we discuss when to meet up at the camp, and Sergey goes off into the forest, towards the hills. However, not wishing to deny myself the pleasure of seeing the dipper again at its nest, I find a convenient place and hide. The dipper flies past over the river, as if it has nothing to do with the nest. Its harsh voice, easily heard even over noisy waterfalls, seems here - against the quiet murmur of the water - rather unpleasant and coarse.

After several minutes it flies past a second time, turns, alights on the very same stone I was standing on a short while before, then flies to the nest and pauses for a moment on a twig, the bright white patch on its breast brilliant against the dark green background. It dives into the nest while a second dipper arrives at the stone, evidently the male. He stamps his feet a little, cocks his short tail, bows and straightens up several times, then flies off.

I leave to wander along the bank, where I have not yet been. I very much want to find a nest, any nest, but if possible something really unusual.

There is always a path beside the river, used by people or animals, or both. This path was beaten out most likely by the feet of animals. There are the hoofprints of elk¹², piles of elk droppings, and tufts of their wool. Just here are the small pellets of a hare¹³. In places the path splits: one branch, the hare track, dives through thick bushes or under low branches

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while the other, the elk's, skirts around such places. Naturally it is easier for me on the elk track than on the hare's, but even so it is not that straightforward. I must constantly stoop, or step over robust windfallen branches and leaning trees. Still, it is easier than hacking my way through the forest.

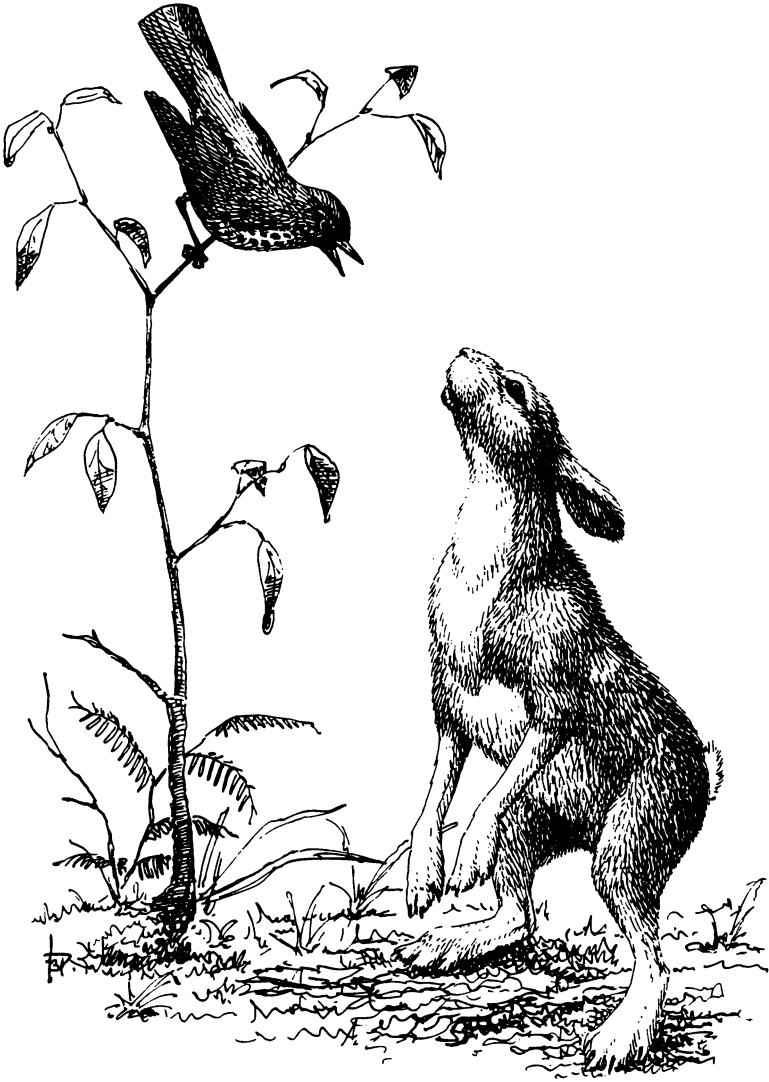
Hunters and other travellers in the forest often make use of animal paths, just as various animals are happy to use our forest roads and paths when they are not too busy.

Further along the path I come across the black 'nutlets' of reindeer¹⁴, familiar to me from the tundra, and then the scratches of massive bear¹⁵ claws on the trunk of a huge spruce by the path. This is how a bear marks its territory. It stands on its hind legs and scratches the tree, trying to reach as high as possible so that other bears coming past will see how big he is and have respect. Such scratching on the part of the bear is more or less equivalent to the songs of birds. These particular claw marks on the spruce are old, filled with resin and darkened. The droppings of the elk and reindeer just here were also not very fresh. And hare pellets can last for many years.

Out of a small fir right by the path flies a song thrush with a frightened chatter, and I catch sight of the nest. It is not very high up and is very picturesque, especially inside: bright pale blue eggs with black spots lie in a bright yellow cup. It even seems that the sun is shining in and illuminating the interior of the nest. Involuntarily I look up at the sky, but as before it is entirely overcast. Song thrushes do not line their nests with herbage, like other thrushes. Instead they plaster the inside with rotten woodpulp cemented together with their own saliva. The result is something like loose cardboard or papier mâché. The nest I have come across is plastered with a bright yellow pulp.

Standing by the fir to sketch and describe the nest in my notebook I see a hare. I freeze. Showing no concern it quietly comes closer along the path. A hare going along at walking pace is not a common sight: they are usually running. Hares are not able to walk by pacing left and right legs alternately, nor run at a slow trot like for instance dogs, cats or horses. They can only proceed in jumps. When a hare is going along slowly it moves its front legs forward as normal, then brings both hind legs with their enormous paws like bast¹⁶ sandals forward more or less together, almost throwing them out sideways. It makes the hare look lame and hunch-backed, and so comical.

Something suspicious alerts the hare. After several paces it comes to a halt, sits down, looks around for a long time, and sits up on its hind



legs twitching its nose and moving its ears around like a horse's. Scarcely breathing I watch it through the branches of the fir. Suddenly the owner of the nest flies in and begins screaming at me. Then it perches on a twig just above the hare and starts screaming at him. This is not to the hare's liking; he raises himself on his paws, smacks his thick lips at the thrush,

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and gives the impression of swearing at the bird in annoyance. It is evidently a tense situation. The hare shakes his lop-eared head, deposits a few fresh pellets on the path, and bounds away in the direction he came from.

In the forest you often come across hollow trees. The holes are of all kinds, and many birds nest in them. In wild forest however, from which dead trees are not removed, most of the holes are empty. I come across some on this excursion too, but those within reach are all empty. However hard I try to find something of interest, using a special little mirror mounted on a handle, I see nothing. I regret not packing special crampons¹⁷ with our equipment: the warblers we have come here to study build at ground level, so there is no need to climb trees to reach their nests.

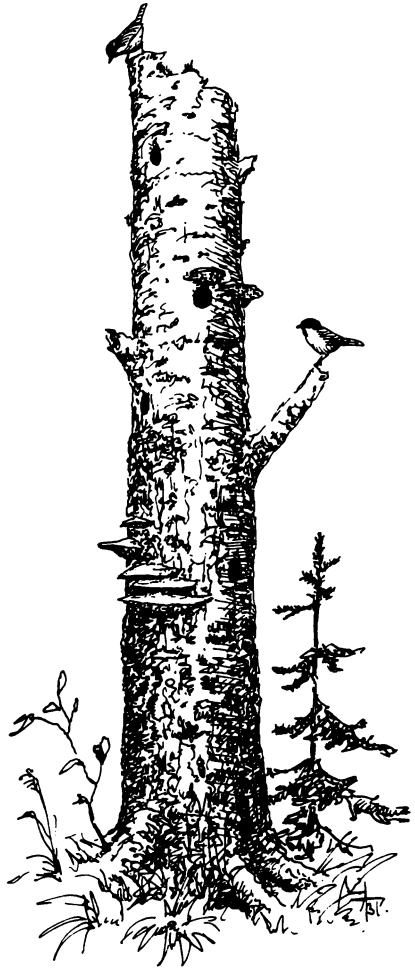
However, one enormous birch stump with holes all around it is of particular interest. At my approach a pair of Siberian tits¹⁸ start fluttering around in the vicinity. These are such plump little tits, inhabitants of the northern taiga and relatives of the *pukhlyak* or willow tit¹⁹ which loves to visit the bird tables and feeders in our town parks and fearlessly sits on the hands of people feeding them with seed. No doubt one of the holes in the birch stump belongs to the Siberian tits. The lower holes are empty however and I would not want to climb higher, even with crampons. The stump is rotten through, groaning and swaying threateningly when I punch it with my fist.

I soon come across another nest. Like the thrush's it too is in a fir and has bright pale blue eggs, but small ones without spots. The colour of the cup they lie in is if anything even more startling - a coppery red. It is the nest of a Siberian accentor²⁰, in the form of a deep thick-walled goblet of green moss. On the bottom there is a layer of plant stems of some sort among which, looking in, I recognise the capsule stalks of the same material - haircap moss²¹. Normally they protrude above the dense cushions of moss like a low reddish brush with, on top of each little stem, a small capsule containing spores - the sporangium. The stem itself is called a sporangiophore. So the accentor has plucked these sporangiophores and used them to line the nest after removing the capsules.

Now why on earth should a little bird decorate the bottom of its nest? Or is there another explanation for this tasteful detail? Perhaps the sporangiophores have antiseptic properties, and the red colour is merely incidental. But why are the eggs bright blue? The colour does not exactly help to camouflage them.

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I wander pensively along the path, unable to rid my mind of thoughts which have struck me more than once before. Where does beauty in nature come from, and what is it for? Why are there such colourful flowers and butterflies? Why do birds have such lovely songs? Remember the song thrush with its yellow nest containing pale blue eggs with black spots. Why does the dipper have such a brilliant white breast, or the bluethroat a blue one? Then there is the blackcock²² with its tail shaped like a lyre. The list is endless. Of course bird songs have a signalling function, as do their colours - for recognition, to help find a mate, and so on. There are colours for protection, warning and scaring off other creatures. Each in its own way is beautiful. There are many instances in which the beauty turns out on close inspection to be just a side effect of something functional. But why are the colours so bright, and the designs so perfect? Why the bright blue eggs?



No, I can never believe that there is nothing more to it than utility and functionality. Perhaps some pattern or colour does indeed emerge by chance, for no reason. It just appears, that is all. But maybe beauty itself could be the object of perfection, and evidence of perfection. I have a deep conviction that aestheticism, the feeling for beauty, and striving after it are qualities not only of humans and human civilisations. They are properties, if not of all life, then of very many living creatures. The feeling for beauty no doubt appeared in the world long before people, monkeys and apes, and even other higher animals.

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Suddenly there comes the clear sound of an axe. The chopping is coming from ahead, by the river. I slow down and soon see a clearing extending from the river up the hill. I recall that when we came past here in the boat, Volodya shouted to us over the roar of the engine, 'Zimnik'. A *zimnik* is a winter road²³, with no bridges, so it is rarely used in summer, and then only with cross-country vehicles and when the rivers are low. Before we left the settlement Volodya said that this *zimnik* goes up into the hills where rock crystal is mined. He showed us some of the crystals, not only some lovely little druses²⁴ but also an enormous block with regular faces stretching for metres, which was simply lying in the porch of the geologists' office, serving perhaps as an ornament, though a very valuable one. The *zimnik* follows the left bank of the Kozhim and is used by tourists. This is an official route sanctioned by the tourist authorities and rated at a certain grade of difficulty. The route is not just used for rambling, but is to be covered in a set time. If you get to the end, without being late, you receive a badge and feel a sense of achievement.

Yes, the chopping is being done by tourists. Or to be more exact just one tourist. A lanky youth in track suit and lightweight red anorak is pottering around a camp fire. His companions are apparently still asleep; in the small, brilliant white tent all is quiet. But he, chilled to the bone as often happens with hikers, was the first to crawl out in order to get the fire going and warm himself up. I stand among the spruce at the edge of the forest and through the binoculars gaze at the youth, the tent and a large rubber dinghy nearby. They evidently crossed the Syvyu yesterday and camped for the night.

Beside the tent lie some strange objects, like small aluminium saucepans with regular rows of holes. I almost exclaim when it dawns on me what they are - ordinary colanders, which we saw in the store at Kozhim while buying provisions. Why on earth should hikers want colanders? Are they going to pan for gold? There is indeed gold in the Urals, but panners use basins of quite a different type. I dream up all kinds of ridiculous ideas to explain the mystery, but none makes any sense.

(Only when we returned to Kozhim on the way home did Volodya provide the explanation. Apparently many tourists were taking colanders with them this summer. According to regulations every hiker on the mountain route was obliged to wear a safety helmet. Kozhim had a control point with its own tourism bureaucrats who would not permit any group to proceed without helmets. But could such helmets be

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procured in this little settlement? Hardly likely. So for the headgear the tourist administration decided to substitute something functionally equivalent. The colanders in the Kozhim shop were ideal: one had only to remove the handles, thank the bureaucrats for their indulgence and kindness, and joyfully stomp off into the hills.)

The youth lights some birch bark, which burns brightly, giving off black smoke. But the birch wood refuses to burn. Not surprising: birch wood in the forest is almost always wet, especially after such rain. I have an urge to break off some dry little twigs, which are always to be found low down on spruce trees, and go to the assistance of the clearly rather inexperienced visitor. But I don't. If they managed to get the fire going yesterday, then they'll manage it today. And what if I go up to him offering help, he looks at me emerging out of the thick forest from heaven knows where, and takes me for either an escaped convict or an abominable snowman? Or if he gets scared and starts defending himself with the axe...? Then again, in a group of tourists there are often a few who are very proud and full of themselves, who never make mistakes, are always in the right and take any advice as a personal insult, the kind who would just say, 'Get lost, old gaffer!' It is not to receive care and sympathy that these lads go into the mountains, in fact quite the reverse.

The youth continues bending over the firewood, lighting matches, now and then wiping his nose on his sleeve, standing up and jumping around to get warm. Quietly I turn and go back into the forest. It is simply that I do not want to meet anyone or mix with people. I am enjoying being on my own in this wet woodland.

It is already late morning, and hardly more than three hours to our dinner. Time to make my way back. The rain has stopped but a light drizzle hangs in the air, almost a mist. Somewhere in the Urals I have heard it called *businets*²⁵.

Out of curiosity I go over to have a look at the *zimnik*. It is a well used dirt track. Over the top of old caterpillar tracks, clearly last year's, a footpath has been trodden. So the tourist season is already under way, and groups are heading for the hills.

But I head for the camp, and decide to visit en route some unfamiliar spots a little way from the river. I choose clearings since I am already soaked enough. But there are rather few of them, and what is more they contain bushes, well laden with small droplets. However hard you try, you cannot prevent them getting under your waterproofs.

I find two nests, both on the ground. One belongs to a little bunting, and the other to a meadow pipit²⁶. Both are familiar, not especially

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exciting, but it is good to find them all the same. I spot another brambling's nest on a birch, but do not climb to inspect it: the tree is tall and bare, with no handholds. It is a very ordinary nest, and we have quite a few of them on our plot.

But just a little further on I notice a suspicious swelling at the top of a not too high spruce. Some herbage is visible. Is the nest a redpoll's²⁷? Or maybe a crossbill's²⁸, a waxwing's²⁹...? It could be anything. The binoculars are already spattered, and the longer you look upwards in such weather the more mist settles on the large objective lenses, and meanwhile the eyepieces steam up. There is nothing for it but to climb.

I sit on some fallen branches, have a smoke, and get into the mood for climbing. I do not like climbing trees. In this respect the tundra has its advantages. Climbing the spruce itself is not going to be possible: it is bristling with dense thin branches, like a giant's bottle brush. The nest is at the top, which is very slender. Alongside however stands a large birch furnished with convenient and reliable boughs. It is this I climb, occasionally pausing and looking up at the nest. When my head seems to be level with it I realise that I have miscalculated: the two trees are some distance apart, and my hand will not reach. The bit of herbage is still visible, but the nest itself is hidden by a small branch with dense foliage. There is nothing for it but to swing the birch back and forth, and for that it is fortunately thin enough at this height.

It works well enough and, holding onto the birch with one hand, I am able to grab hold of the thin trunk of the spruce, pull myself over and peer into the nest. To do this I have to push aside the prickly wet branch hiding the nest with my face, having no third hand. Then I see a ball made of plant material, with a hole in the side. A neat little bird pokes its head out of the hole. It utters a thin 'feeeet' directly in front of my nose, and flits away. Well, this I had not expected at all - a chiff-chaff³⁰.

From surprise I almost let go of the birch, but just in time manage by reflex action to clench my fist. It was a near thing: I could have crashed to the ground, taking the nest and top of the spruce with me. Sweat breaks out from the fright. I scarcely have the strength to pull myself across once more and move the branch aside with my nose. With one eye I can see inside the nest, which is filled with large white feathers, while the three eggs are pink with small black flecks.

It is a pity I am neither ape nor gymnast. It takes a long time to descend, carefully moving my suddenly trembling legs from branch to branch. Eventually I am sitting once more on the same fallen branches and calming down, while making the necessary notes and sketches.

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But what a surprise! Chiff-chaffs build their nests on the ground or not far above it in bushes. In the southern Yamal, where forest grows on the flood plains of rivers, I have found chiff-chaff nests in spruce trees but not more than one and a half metres above the ground. Here - I estimate the height of the spruce - it is eleven or twelve metres up. That is the height of a third storey, or perhaps just a second. How come I didn't fall? I'm reminded of Gorki - 'wings broken, feathers lost....'³¹ Broken branches... broken ribs... lost feathers... - those feathers in the chiff-chaff's nest. Incidentally, whose feathers are they in the nest? They have to be from a willow grouse³². They are also generally found in brambling and willow warbler nests. The willow grouse fly here in winter when they move south off the tundra. They are prey to any predators here, and the feathers remain and go to keep nests warm. The grouse themselves on the other hand never use feathers in their nests.

Once again I look at the birch and the spruce. I imagine how awkwardly I had been perched up there. Tarzan would not have been at a loss. But poor little warbler, sitting snugly in its cosy nest, and there suddenly, blocking the view, is my ugly mug. It strikes me as very comical. Then another image occurs to me: I imagine what I would look like now to someone else - a rather wet man sitting in the forest, quite alone and laughing his head off. It is certainly a little more curious than that youth and his moribund fire. So I laugh even louder. It is obviously a relief that I did not fall out of the tree; and I am pleased that, there up above, I had such a short yet such a wonderful (for me) and unexpected meeting with the chiff-chaff, an experience which I shall never forget. What a sweet little face it had! And the nest remains intact. Not a single chiff-chaff sings on our plot. There are very few here.

Soon my damp excursion is over. Approaching the tents I remember the hikers. Say what you like, their sense of purpose is not at all a bad thing. Far better that than mooching about the whole forest, scaring our birds, stumbling through our nets and poking their noses into our tents. Let them keep to the path. We want to be left alone. Let them keep to their schedule and receive badges for their so many kilogram-hours of effort. They are welcome to go right past this magical spot, bent double under their rucksacks, panting on the ascents and wiping the sweat out of their eyes. Let them stare at the legs and rucksack of their companion in front. If that is what they want.

But are we any better off? Day after day, we wander around in the vicinity of the tents, looking for nests, staring at little birds and thinking everything is hunky dory. Yes, it is difficult to decide which - they or we

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- are more eccentric in comparison with all the rest of humankind. But they and we are at least content, each doing his own thing.

Sergey has already got back, changed and hung his wet clothing up by the stove. On the stove is our much travelled saucepan. We eat plenty of traditional rice *kasha* and *tushenka*³³, drink weak tea - not too much stimulant before turning in - and climb into our cold sleeping bags. Warming up, we continue swapping news. Among Sergey's interesting finds is the nest of a grey wagtail³⁴. I must go and have a look at it.

'You didn't hear any arctic warblers?' asks Sergey, when I am practically asleep.

'I would have said.'

Would I really have kept quiet about such an event? But where on earth are these arctic warblers? After all, everything is already in its prime; summer is here. Somehow it is rather disturbing. What if they are not coming at all? Anything might happen in this 'mysterious world of Nature', as the journalists dub it.

Hardly audible, the drizzle pours down on the tent. We drift off into sleep.

7. A LITTLE MORE ON

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ПОДРОБНЕЕ О МЕЖВИДОВОЙ ТЕРРИТОРИАЛЬНОСТИ

With the arctic warblers not having arrived yet, I'd like to tell you a bit more about why we are still waiting for them so expectantly, and about what interests us particularly in their relationships with other species.

The idea of making a special study of the interspecific territorial relations of willow and arctic warblers occurred to me long ago when I was working in the southern part of the Yamal peninsula. There both warblers nest in wooded flood plains surrounded by tundra. The territories, which the males mark out by singing, are mutually exclusive: no willow warbler sings where there is an arctic warbler, and vice versa.

The fact that two closely related species living in the same habitat have non-overlapping territories fits neatly into generally accepted ideas about the coexistence of closely related species. The separation of their territories should be a consequence of competition for food.

Everything seemed to fit in with conventional theory. But one thing was not clear. I had mapped their territories in July, without knowing how this mutual exclusion came about or which species instigated it. In fact all other details were also unknown to me.

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For there to be mechanisms guaranteeing territorial exclusion between two species, the species must 'rub off' against one another over many generations. As a result of this interaction the males of one species become aggressive towards the males of the other species. We know that aggression is a successful means by which our Azhik, Pyzhik and the rest defend their territories against other males of the same species.

All leaf warblers¹ look very much alike - small brownish-grey or greenish-grey birds. Could this outward similarity be a result of common evolution? One hypothesis runs like this: two species evolve to look alike, so that they will not compete with each other; the similarity brings about mutual aggression which, in turn, results in mutual exclusion from their territories. It would be quite simple: 'If he looks the same as me, beat him up!' An explanation of this kind would imply a common evolutionary fate for the two species. But the willow and arctic warblers do not fit this idea of a common evolutionary fate. In origin the willow warbler is European while the arctic warbler is a son of Asia. So aggression towards the competing species could not have developed while the two species were forming. Maybe it appeared later, when the species met. But by that stage their external appearances would have been in their finished state: they could not have been the result of common evolution.

Here is another theory. Suppose that the aggression of each species towards the other merely results from mistaken identity. By chance the species turn out to be very similar in appearance, and now they fight each other simply because they cannot tell each other apart. Well, if that is the case, it is a very convenient mistake - assuming that there is in fact something to compete over and fight about. The simplest assumption would be that they are competing for food.

This raises some questions: what is the origin of the interspecific aggression, and is there actually competition for food, or for something else?

Judging by the distribution maps of our two warblers, the subarctic Urals are an area in which the willow warblers spreading eastwards and the arctic warblers spreading westwards met quite a long time ago. The spot where we are now is in the middle of a vast area where the species coexist. How it all came about will clearly never be known for certain. Perhaps we could hope that palaeontologists somewhere will dig up the fragile remains of the tiny birds and draw appropriate conclusions, but there is no chance of that happening. It would be easier to find a needle in a haystack, even without a magnet.

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Perhaps the mammoths were witnesses of this meeting of species. Or did it occur after the mammoths had gone? It appears that nobody made a record of the event. Even if one of our round-shouldered ancestors had become fascinated by our warblers - such tiny and unobtrusive little birds - and painted them on some as yet undiscovered rockface, still we should not be able to tell whether they were willow or arctic warblers. Even in some modern zoological illustrations you cannot always tell them apart. So we are left with having to judge, very approximately, the time of their encounter just from the map of their present ranges. If the willow warbler colonised the whole of northern Siberia and the arctic warbler the whole of northern Europe, the Urals - including their northern parts - would have been conquered by both species long ago. Perhaps they would have had time enough to learn to live together.

So we have come here to try and find out what they have learnt in the time they have been cohabiting.

The next day there is still a cold drizzle. Sergey goes off to continue looking for warbler nests on the plot. I drag our rubber dinghy out of its box, pump it up, and take it down to the river. My idea is not just to go on an excursion or carry on with our 'spontaneous hunting' in places not yet visited. The river is a bit over a hundred metres wide: is that a large or a small distance for a warbler? I need to check whether any of our ringed birds can be found on the other side. The results should speak for themselves. They will also give us a rough idea of how our willow warblers on the plot relate to those on the other side, in other words indicate how far the river functions as an ecological barrier. In any case it will be interesting to see what kind of place it is over there.

Because of the rain there is now more water in the river, which is becoming muddier and more turbulent. In choosing a place to cross I have to take account of the fact that the current will carry me along rapidly. Earlier I scanned the opposite bank and spotted what looked like a tiny backwater where it should be possible to moor, so now I drag the dinghy a long way upstream. Fortunately the crossing goes like clockwork.

Cursing the dampness which penetrates everything and makes observation difficult, I go right along the bank opposite our plot. Here there is hardly any floodplain; instead a gentle slope rises straight out of the water. The forest is different too, with few spruce, more birch, and along the bank alder and willow. There are also clearings - not like those on our side of the river, but with bare stony patches.

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I manage to examine quite quickly all the willow warblers singing this morning in the strip of woodland along the bank. Only one turns out to have rings - KA. That means that the river represents quite an appreciable barrier to the warblers, and they fly over to our side only rarely. So any interaction between the warblers on the two banks is of minor significance. In the back of my notebook I keep a record of all the ringed warblers: KA was ringed in the early days of our work, and we haven't caught him since.

Here a thrush is singing beautifully. It can be heard even from the plot, but the distance and the noise of the river rob it of its clarity. Now I have the chance to listen to the soloist properly. It feels just like being at a concert - not otherwise occupied, not passing by, and with no radio interference. As is my habit when stopping for a smoke I seek out a convenient fallen tree. The spot is just right. I can sit comfortably and lean my back against a birch trunk.

The fallen trees in the forest are overgrown with moss, always damp, and in rain absolutely sodden. But we can sit on them without getting wet beneath thanks to pieces of reindeer skin which we hang over our backsides from our belts. I thought up this original seating arrangement a long time ago when working on the tundra, and colleagues found some merit in the invention. So now each one of us never forgets to take his piece of hide, which we theatrically call our '*zadnik*'² or 'backdrop'.

At first I just sit, smoking and listening. The thrush's pure song is delivered at a measured pace, with expressive pauses. There is a complete absence of unpleasant lips and crackles. It lends a delightful tranquillity to the relaxation and to the contemplation of the landscape, which is gloomy but still picturesque.

Soon my lyrical mood becomes a little more businesslike. The thrush is singing in one of several tall spruce trees, but is not visible. Incidentally thrushes, especially song thrushes, are rather cautious, and not all will allow themselves to be spied on. If they had been the objects of our study instead of the warblers, life would have been very trying. But there is no need to observe this one. Knowing that thrushes like to build their nests among conifer foliage I start examining the spruce trees in front of me through the binoculars. Quite soon in fact I spot a thrush nest, but it is some way off and I cannot see a sitting thrush. The nest might be unoccupied.

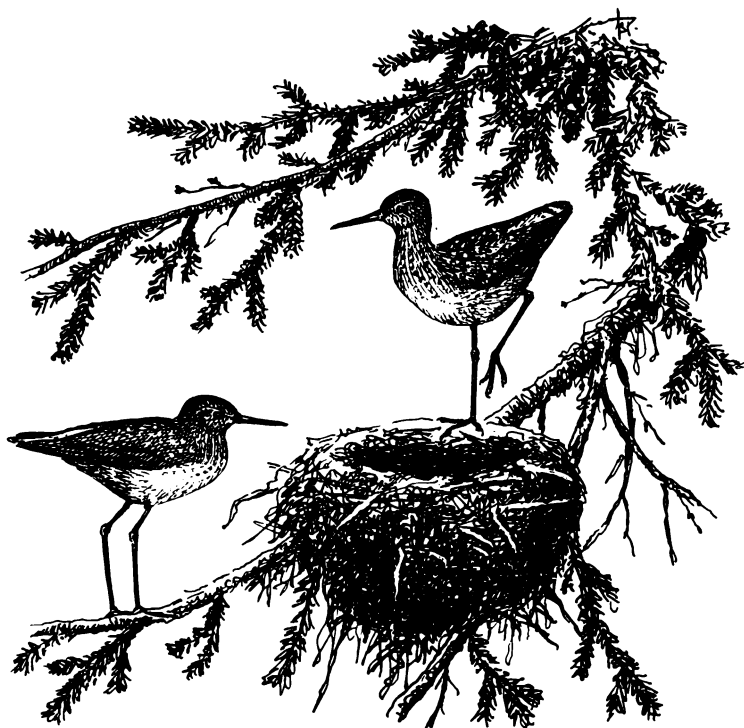
The view before me changes somewhat. The amorphous greyness suffused through the air begins to disperse. It stops drizzling and the fog lifts to become cloud, although it remains low, hiding the tops of the

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trees and the slopes over on our side of the river. The transformation lifts my spirits.

I want to get up, but catch sight of two green sandpipers overhead. One of them gives its graceful call, 'tyuulli - tyuulli - li...', then, flying almost with wings touching, they execute a beautiful dive between the spruce trees and settle right by the nest which I have been examining from my throne.

Aha! This means it is their nest! We have not yet found a green sandpiper nest here, so this is exciting. Green sandpipers live beside forest streams and rivers; rather than building their nests on the ground like other waders, they choose trees, and often old thrush nests.



I watch the sandpipers, expecting one of them to sit on the nest and begin its very characteristic body wiggle while spreading its brood patch. Instead though they are somehow indecisive. They stand, look around, march on the spot, walk up and down along the branch, and bow just like other species in the genus *Tringa*³. At last one of them goes to the

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nest but only stands on its edge, then hops into it and out again. After this both fly off. Several mating calls can be heard one after another, fading into the distance.

Suddenly I feel an unpleasant sensation, as if someone is watching me. On impulse I look around, but see nobody. I never get such a feeling when birds are watching me. Who ever can it be? It happens very rarely, and only once in a similar situation I looked around and saw a dog, either stray or simply wandering around the forest. Right now all is quiet, with no suspicious sounds, shadows, or movements. Only occasionally are there faint rustles, and leaves quivering from falling drops - just as always in wet weather.

My thrush has fallen silent. Not far away a brambling begins calling anxiously, evidently not at me. It is joined by willow warblers, then the calling becomes more distant and soon ceases altogether. I go over in that direction and try to find traces of whatever it was. But on the sparse, untrodden vegetation there are still droplets, and no signs of any sort. The brambling flies up and starts calling at me, but otherwise everything is quiet. The mystery of the unknown being remains unsolved - one more glimpse into the otherness of this secret world of the wild.

The thrush nest which the green sandpipers had flown to turns out to be an old empty one, containing plant matter now gone brown but still with a strong cup of grey mud. The sandpipers were evidently prospecting before making their choice.

8. THE DEMISE OF KACH ГИБЕЛЬ КАЧА

5th June. The belt of uninterrupted rain has passed over us. We are not trapping all the time now, only in 'raids'. All the male willow warblers singing in our study plot have already been caught, and now it is the females' turn. They are not as mobile as the males; they potter about in a tiny area near their nests and take no part in skirmishes. As before, the males often land up in the nets two at a time - pursuer and pursued - and even in the net they still carry on the struggle. Meanwhile the females, in no hurry at all, flit from bush to bush and from tree to tree. So they often spot the net in good time and make a detour. Their unhurried manner and good sense make ringing them a slow business.

Even so males are still turning up unringed, and sometimes we find ourselves disentangling from the net old favourites who are, however, not singing in the plot. Some of them have their territories in the forest

elsewhere, even quite a distance away. Others are apparently still wandering around in search of an unoccupied patch. Everywhere they come under attack, and so they have become social outcasts, disturbers of the peace enjoyed by their houseproud cousins.

At present I am going around the nets on my own, because Sergey is searching for nests - an urgent task right now.

Unexpectedly it has started to rain - cold and drenching. I run to gather up the nets. A bird caught and left hanging wet in the net can very quickly freeze to death. As if on purpose the nets today are widely spaced over the whole plot. One of them is in Pyzhik's territory and there I find him, already pretty wet, and next to him that old terror Zhak. It is clear what has happened: the inquisitive Zhak chanced once more on his distant neighbour, who saw him and gave chase. And so they landed up here in the net, hanging side by side, both wet and bedraggled.

In general a male is caught on his own territory rather rarely. Here he knows every little twig, and any change alerts his attention. Quite often we have seen how such a tenant, already acquainted with our crafty traps, calmly hops from twig to twig around the net and, having understood the lie of the land, flies around it. All the same, in the heat of the chase Pyzhik got caught.

As if deliberately, both have got themselves thoroughly entangled. First I place my cap in the pocket of the net, directly on top of Zhak, to protect him from the rain. He is the guilty party - so he can wait. I too am wet through, but I am large and he is small¹. For a long time I fiddle around with Pyzhik, then get him out and put him inside my shirt where it is relatively dry and warm. Then with numb fingers I free Zhak and stick him under my shirt next to Pyzhik.

Meanwhile the rain is easing off. The wind continues to blow the trees around fiercely, showering us with spray. I visit several more nets but they are empty and cause no delay. I turn back. In a net on the territory of the same Zhak who is nestling inside my shirt, there hangs a puny little bird with sodden matted feathers and clenched feet. It is Kach, Zhak's neighbour. The two have been pursuing a protracted land dispute, not yet settled. But I am too late, Kach is already dead.

Back in the tent it is warm and cosy. Something is about to boil on the stove, and above it Sergey's wet clothes are steaming. He himself, as usual when the weather is bad, is busying himself with one of his gadgets. There are evidently signs of mourning on my face: my comically bedraggled appearance does not call forth the ironical remarks usual

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on such an occasion. Expectantly Sergey gazes at me. I hold out my hand to show him the sodden corpse.

Pyzhik and Zhak are now wandering around under Sergey's dry shirt; let them scratch his stomach for a few minutes. Of course it is good to feel that they at least are hale and hearty - but their claws are devilishly sharp. And, I have to admit, ever since childhood I have loathed being tickled.

Over the end of the table a few darting sun flecks appear on the yellow roof of the wet and so just now particularly bright tent. In the sky wisps of cloud hurry past, chased by the wind which is dying down. In the words of another writer, 'The forest refreshed fills once more with the carefree song of the birds.'

It is time to release Pyzhik and Zhak. What an amazing thing a bird's feather is. It only needs to dry out and, hey presto, it is smooth again and as good as new. Once freed the prisoners settle for a moment on the nearest tree, but only to have a good shake. Then, paying no attention either to us or to each other, they straightway fly off in the direction of their territories.

Trying as best I can to avoid showers of water from the branches, I follow along the paths we have already trodden many a time. Pyzhik is in his place and very busy, singing lustily and flying about his domain. We are well aware that bird song is an onerous task necessary for themselves and their offspring, and not at all a carefree distraction from idleness. In any case it would be difficult to call Pyzhik carefree. He is obviously still very hungry, and manages between snatches of song to catch and gulp down this or that insect, and even now and again to preen. That prompts a slightly embarrassing thought: whose chest was it - mine or Sergey's - that makes the bird feel he needs to cleanse himself?

I take the path to the far end of the plot, where Zhak resides. A little sunshine, Pyzhik's good health and the change into dry clothes have put me at ease and in good humour. Of course it is a pity about Kach. But otherwise everything has turned out alright - the weather, and Pyzhik. After all his territory was not usurped by some other bird. But, hold on a moment....

In a flash all sense of celebration vanishes, and my leisurely stroll turns into an urgent run. It is so obvious - why did I not think of it earlier? Something should be happening now on the territory vacated by Kach. I berate myself as I run: I had been feeling sorry about the casualty, and had not bothered to think beyond that.

In Kach's territory there is a bird singing. During the run through the bushes a cover came loose from my binoculars and is now swinging free on the end of a strap. So the lenses are well spattered. I carefully try to wipe them with a dry rag, but it doesn't help; the air is very humid, the glass does not dry off, and all I can see is a little bird's blurred silhouette. There is no choice but to follow it and see what I can with the naked eye. He seems to feel not quite sure of himself in his new possession. He sings more strongly than all the others, which is quite natural for a newcomer. I follow him around as he visits all the main song posts used by Kach - fifteen or so of the tallest spruce and birch trees.

The newcomer is not yet singing at the edge of Kach's territory; first he must secure the centre. Later he can afford to stake out the boundaries with his neighbours. They can be heard easily. I recognise Koku's voice - his song is marked out from all the others by a slightly questioning intonation in the last phrase. The other neighbours are also in place. And Zhak is singing. An interesting thought: what happened in his territory when he arrived back after his wet imprisonment? Or again, is this really Zhak who is singing? Yes, of course it is, because he does not stress the first syllable like the other willow warblers, but the second. So all is well, Zhak is where he should be.

At its north end Kach's territory adjoins the river, and KA is usually singing on the other side. But now I cannot hear a cheep from him. Has KA decided to extend his territory to both banks, including a 100-metre stretch of the river itself? That would be a bit too much for a willow warbler. I stand for a long time on the bank under the birches, holding the wet binocular lenses out in the sun. I haven't yet learnt to recognise KA's song. I listen: is he or isn't he singing over there on his side? But the murmur of the water and the hubbub of the bird chorus make it difficult to hear.

At long last the binoculars dry out and on the newcomer's leg I manage to see a red ring. The foliage makes it difficult to make out the other leg. The binoculars mist over again. It is all very frustrating. But look - there is the little white flash of an aluminium ring. Can this really be KA?

An explanation is already forming in my head. Most likely it is all a question of territory quality. Kach's former territory where this bird (KA?) and I are playing hide and seek is open, with bushes and clearings - in short, good willow warbler habitat. But on the other side of the river, on KA's patch, there is a lot of alder along the river, and hardly any clearings. Of course he has been across here before - he knows the

whole area. And when he noticed Kach's prolonged absence, he promptly took up residence.

But what if it is not KA? You see, I am not yet sure how the two rings are arranged; the bird might be AK. I reach for my notebook. But the newcomer has just flown down quite close. Cautiously I take one step sideways and now have a good view: the aluminium ring is on the left leg, and the red one on the right. So it is AK! '*Kto takoy? Pochemu ne znayu?*'² ('Who is this? Why don't I know him?') - for some reason a phrase from the film popular in my childhood, about Chapayev, flits through my mind. Once more I leaf through the notebook.

So, here is something to think about. AK was ringed on 25th May in Azhik's territory, and was caught three days later in a net in Zhak's territory. That is all. He has never been seen singing either on the plot or outside it. Taking everything into account, it seems he must have arrived with the 'second wave' of willow warblers, when there were already no more vacant territories. If so he is a typical member of what the biologists call the 'population reserve'. Well, he deserves to be congratulated - he has been lucky. With our help, admittedly, involving a killing no less. But there was no conspiracy, and AK bears no guilt.

The substitution of AK for Kach took place within an hour. No, a little more than that - we had had time for a meal. How it happened I didn't see. While it was going on I was shovelling *kasha* into my mouth and washing it down with coffee. Anyway, we missed it. Perhaps there were fights, chases maybe - but then I would have seen some other member of the population reserve in the neighbourhood. Or it could have happened all rather quietly: AK flew in, looked around, listened, and then started singing. No more than that, just a low-profile change-over like in an office - a vacancy arises, the new employee slips into the empty chair, carries on the work he is already so familiar with, and no-one bats an eyelid.

Where though was AK when he had no territory of his own? We have only a couple of clues - the two captures, three days apart, and now this new encounter eight days later. In that time AK could have flown hundreds of kilometres, or equally could have led the shadowy life of a quiet bachelor here on the plot or nearby. All this is pure speculation. Of more interest would be to know how many of these quiet bachelors there are, and what kind of relationship exists between the males with and without territories - in short, to know everything there is to know in quantitative terms about this population reserve. Unfortunately we are a long way from having that kind of understanding. But we do have

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confirmation of one early finding: all the good willow warbler territories have been taken up, and there are surplus males around.

It will also be fascinating to see what happens when the arctic warblers arrive. Where will they go? To judge from work done on the Yamal Peninsula, they ought to take up empty sites - but here there aren't any! Will there be a new round of vicious fights, with arctic warblers expelling some willow warblers from their territories? They may be no bigger than the willow warblers, but they are certainly stronger. Or will the arctic warblers, meeting stiff resistance in the competition between species, settle in thick forest not favoured by the willow warblers and so not occupied by them? These are as yet open questions.

As evening approaches on 5th June, there are still no arctic warblers. It has seemed for some time that they may not be coming. Absurd perhaps, but that is the way it looks.

It is getting dark. The day-time songsters are quietening down, among them our willow warblers. The longest to carry on is the newcomer AK - no surprise in that. And yes, surely it is time he was given a name. AK - Aksen? Akim? Akakiy? Akakiy Akakiyevich - small time official... a vacancy has arisen.... Yes, there are some associations, but rather tenuous and convoluted³. Perhaps best would simply be 'Akim'.

9. REMINISCENCE: THE BALALAIKA

ПЕТРОСПЕКТИВА: ПРО БАЛАЛАЙКУ

We are having supper to the accompaniment of thrushes. It is a clear night, cold and quiet. Strange though it may seem, the loud thrush song and occasional phrases from other birds do not dispel the impression of profound silence. The forest stifles the sound of the river, which hardly reaches us. There is none of the usual whining of mosquitoes. From the river a liquid mist flows along the banks. Like round pellets of ice, raindrops hang from the grass and twigs. Listening to the crackling of coals in the dying fire we smoke and chat light-heartedly about this and that. We have no desire to do anything serious on such a night. It is time to turn in, but we don't feel like it.

Then an arctic warbler starts singing - just one song lasting for a second or a fraction longer, monotonous and not very loud. Dzer-dzer-dzer-dzer-dzer. It makes me think of a volley from an automatic, short and harsh.

'There it is!' I exclaim right in Sergey's face. He even starts back in surprise.

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'What?'

'It's an arctic warbler!'

'I don't hear anything.'

'How could you not hear it? It is somewhere over here.... It sang, like a horse!' I don't know why I dragged a horse into it. I was very excited, and even indignant: how could he fail to notice a song we have been expecting for so long, so clear and unmistakeable? Perhaps there was some connection with a horse after all.

We get up from our woodblock seats and go over to where the arctic warbler's song came from. We spend a long time peering into the green twilight and listening, but there are only thrushes and the sound of the river. Then a woodcock flies over - khor-khor-khor - and after that just the thrushes, and nothing else.

When we sit down once more at the fire, as if quite incidentally Sergey remarks, 'You know, I too played the balalaika once....'

The reference to the balalaika recalls my far-off childhood. In various forms this theme has cropped up between us on more than one occasion. Yes, I have to confess, I once played the balalaika.

When I was about eleven years old I went along to the local House of Culture, found the door marked 'Music Class', shyly opened it, and found in the large room a kindly, black haired man with a gentle expression.

'Hullo, I want to learn to play the guitar.'

'Another time, the guitar class is already full up.' Moving away a little from the table and his notes he continued, 'Here is a balalaika - I can teach you to play that.'

I had no desire to play the balalaika, but the man looked very friendly, I had no need to hurry away anywhere, and so no doubt with a very glum expression I listened to his gentle advice not to be so fixed in my ideas, not to make a choice too hastily, and anyway why not hang around for an hour or so? On a special rack on the wall hung and stood balalaikas of all sizes. I was particularly struck by an enormous bass balalaika standing on its own, like a statue. There were other string instruments, not three-cornered like the balalaikas but round; these were *domry*¹. There were also *gusli*², kettledrums, cymbals, and so on. The room contained a great many chairs, scattered around seemingly at random.

People began to arrive. They were of all kinds, but most striking were the elderly men with intelligent faces, who in a very serious manner took down these *domry* and balalaikas and found their seats which, it soon

became clear, had all been carefully arranged. They tuned their instruments, each playing something by himself. Soon I was in the midst of a horrible cacophony, rather like what I had heard coming from the orchestra pit when I was taken to the opera. There were young people here too, and even school children scarcely older than myself.

Then the rehearsal began. I had been expecting dance tunes with *chastushki*³, but instead they played classical compositions, most of which I had never heard before. But it was lovely. I spent the whole evening sitting in a corner entranced, with a feeling of unreality at what was going on and an unfamiliar blissful warmth inside. This was a good amateur folk orchestra.

To cut a long story short I became part of the orchestra, at first joining a beginners' group and later playing an ordinary Russian balalaika in the orchestra itself until I left school and went to university. Later I often regretted that I had not left the orchestra and learnt to play the guitar. When you are on an expedition a guitar is something very special. Somehow I never got around to it. Since then I have never played anything. But I love music. I recall that orchestra and the balalaika with gratitude and a tinge of nostalgia.

That musical experience gave me an undoubted professional advantage. Music trains one's ear in a very special way. It is quite easy for me now to remember birds' voices and songs. It is more difficult for Sergey; he has not such a good ear, and takes longer to learn them. The arctic warbler is just the latest example. On some other occasion I told him about my musical past, and now if it happens that I catch him out on birdsong he brings up the balalaika.

Even though we sit quietly for a long time, we do not hear the arctic warbler again. We endlessly discuss our strategy if, tomorrow, arctic warblers should make their appearance on our plot. But why is the arctic warbler singing during the night? Of course night here is just a relative phenomenon; really it is no more than twilight. Even so at night the diurnal birds fall silent and sleep - albeit for just a short time, two to four hours. Only the thrushes, redstarts and bluethroats sing all night - birds which in temperate latitudes like to sing early in the morning and late in the evening. Here their morning and evening fuse together. But leaf warblers are diurnal birds. So why on earth is this arctic warbler singing in the depths of night? We sit discussing this problem, and decide that since the bird has just flown in from the east, by inertia it is still living by eastern time, and there the night is already over. We have each experienced the same when we have flown by plane from east to west.

10. WHERE THE ARCTIC WARBLERS SETTLE DOWN ГДЕ ПОСЕЛИЛИСЬ ТАЛОВКИ

We sleep badly. During the day it was over 28°, and at night it is difficult to believe there is a frost outside. It is stifling inside the mosquito net, impossible to breathe. Dozing in the stuffy air we keep our ears pricked, in case the arctic warbler sings again. It doesn't. Nothing but the whine of mosquitoes and the voices of familiar birds.

On calm frosty nights like this we are often outside, on the plot. We search for nests. It is routine work, but we cannot just lie in the tent doing nothing. We are now expecting the arctic warblers at any moment - yesterday was the first warning. We are like the sleuths in detective stories who read adverts, study window displays or ogle attractive women while lying in wait for their quarry - only in our case it is nest-hunting.

Then an arctic warbler breaks into song, but not before the sun is already up and the willow warblers are singing away.

It happens on Pyzhik's territory. Both of them are audible. If the male arctic warbler had sung with a willow warbler's song there would have been no way of avoiding conflict. But the songs are not at all alike, and so Pyzhik does not react. They cannot see each other among the leaves. The arctic warbler executes one song after another, and flies closer to Pyzhik. Soon Pyzhik catches sight of a warbler on *his*, Pyzhik's, rightful birch, and without warning launches an attack. The arctic obediently flies away to Azhik's territory and as before continues his harsh songs, one after another.

I cannot hear Azhik. He is evidently otherwise occupied, or has set off on one of his regular trips around his neighbours' properties. The arctic warbler gradually makes his way through the tall woodland, keeping for the most part to the tops of the trees. Following him I soon emerge onto the campsite. Sitting at the 'dinner table' I continue listening and at the same time manage to drink a mug of cold tea.

Then he once more moves off through the trees with his songs, never stopping in one place for more than a minute or two. Again he brings me to Pyzhik's territory, to Zhuzha's, and finally back to the camp. The tea has been finished, so I simply sit at the table. Everything is quiet and peaceful, with no more confrontations. The new songster, taking advantage of the difference between the two species' songs and the cover offered by the unfolded leaves, goes unnoticed by the willow warblers. His territory is gigantic, more than four hectares, and covers four willow warbler territories.

ARCTIC WARBLERS

What sort of mutual exclusion is this? Obviously the situation is as follows. The tall and fairly thick woodland will allow the two species of warbler to avoid noticing each other. Conflicts which will occur when there are chance visual contacts can be disregarded. On the Yamal Peninsula, by contrast, since the woodland there is lower and more sparse they can often see each other, so they come into contact more frequently, and that means fights. In order to avoid this happening their territories must not overlap. It all seems as clear as daylight. This is how hypotheses develop, in the course of explaining events as they occur from day to day.

So far there has been only one arctic warbler on the plot, a single male. What is to prevent the arctic warblers making peace with the willow warblers in just the same way, even when there are many arctics? The males will occupy the whole wood, establish boundaries between their respective territories, and resign themselves to occasional conflicts into which they will be forced by the willow warblers. That is all - and there will not be any interspecific territoriality. So it only remains to await the arrival of more male arctics and observe what happens in order to confirm the new hypothesis.

After half an hour a second arctic warbler appears - once again a male. He is singing on the territories of five willow warblers, now in bushes only just above ground level, and now in spruces at a range of heights. I follow him for an hour, and in that time there is not one fight, not one close encounter with a willow warbler.

Following the third arctic warbler is even less interesting. This one has selected four birches growing close by the willow thicket belonging to Zhak. It is an 'empty space', the neutral zone between two willow warbler territories. We already know that areas like this are also guarded, but the arctic sings in a different language. It is interesting to ponder how this male knows that he must sing in this exact spot? Is it by chance? Or has he, before my arrival, already sorted things out with the willow warblers? I have missed my chance of finding out.

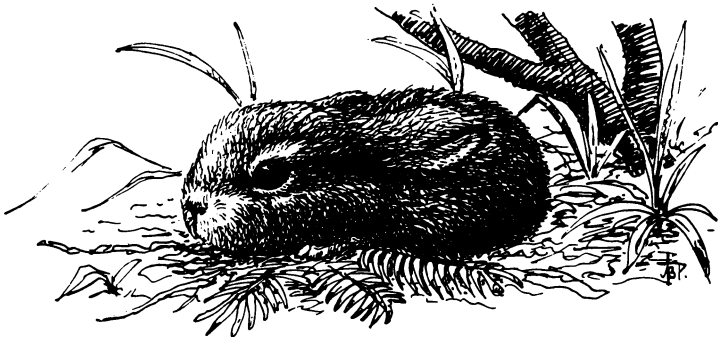
I sit for a long time on a mossy fallen log. It is getting a bit boring. Beside me two little buntings are behaving aggressively towards each other. Most probably they too, like the willow warblers, have no vacant spaces, so tension rises when there are new arrivals. Although just now I ought not to be spending time on them, I sketch the mutually aggressive poses of the males. There are several such poses, no doubt differing in certain nuances, just as the ill will between quarrelling people may be expressed in very different forms, from subtle hints

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through swearing to fisticuffs even. I cannot read the subtleties in the little buntings' behaviour, and indeed no-one else can either. It is generally true that decoding bird language, or that of other animals, is a difficult area to work in. Lengthy investigations are required for each species, using tape recorders, complex sound analysers, filming and so on. In some academic papers and books I recall seeing drawings of several poses of various species of buntings, but almost entirely lacking in any explanation of their meaning. One particular pose comes to mind, and now the little buntings in front of me also adopt it several times: the male opens and lifts one wing, like a flag, and invariably the wing used is the one furthest from the opponent.

My attention is attracted by a barely noticeable movement in the vegetation. I can see a glistening black eye. There, it blinked - the same movement that I saw before. And now, like a photograph immersed in developer, around the eye appears a complete image of a leveret. It is quite small, and hiding in the sparse herbage under a bush - amazing to think I have been sitting here for so long, just three paces from it, without noticing. I cannot resist going a bit closer; it doesn't run away. Perhaps it can't. What a charming creature! I should like to take it in my hands and stroke it. But the leveret is no longer prepared to test my goodwill, suddenly jumps up, leaps across to the next bush, and freezes as before. Let it stay there, and wait for its mother. For some reason we never once saw her, even though she must have been living somewhere close by in our patch of forest.



ARCTIC WARBLERS

It would be interesting to know who first said that a female hare feeds any leveret she comes across, not only her own. Has anyone made a serious study of the family life of hares? Or all those old wives' tales about the communal life of parents and offspring among hares - are they idle flights of fancy which simply pass from one book to another? Perhaps like the pretty story of the sunflowers always turning their heads to face the sun: when this was checked out it was found to be pure fabrication.

I remain sitting, listening to the arctic warbler, watching the leveret, and wondering about fencing off several hectares of the forest before releasing hares into the enclosure. How would I mark them, what names would I give them, how would I observe them in order to see everything without disturbing them? The hare is a nocturnal animal, so a study of their behaviour would have to be made here, in the far north, where the nights are light and everything can be seen.

The leveret is sitting in the same place, quite still, but occasionally closing its eyes as if asleep. I call to mind another legend about hares, to the effect that they can sleep with only one eye - first one, then the other - so as to be ever vigilant. This is evidently another of the far-fetched 'wonders of nature' which writers love to spread about.

Watching the leveret through binoculars gives me considerable pleasure. Here in this small creature is a portion of that same beauty which, if Dostoyevski is to be believed, should be able to save the world¹. 'Beauty' means many things to many people. Think of a dog. It is a beautiful animal. But some people created the breed of boxers, while others chose to breed quite a different animal - the goggle-eyed, slow-witted and neurotic toy terrier. I sometimes wonder whether the breeders who created these animals were altogether of sound mind. But, believe it or not, there are admirers of such dogs. There is something incomprehensible yet also repugnant in this tender enthusiasm for monstrosities.

The arctic warbler is still singing on those same birches. I abandon him, since I must look for others. And as for the leveret, how on earth



can it sit calmly here right beside the enormous and terrible animal that is me?

I walk through the plot and see the nets now set out in working order. Sergey was up early to begin trapping. Behind me I hear a 'fee-fee-fee-fee'. It is the sound made by a short-winged cuckoo². This however cannot possibly be one; instead it is Sergey calling me. In our country this species of cuckoo lives only in the south of the Far East, and we heard its call on a record. We chose it for communication between ourselves since it is easy to whistle, and easy to hear and recognise. It is so unpleasant to hear humans bawling through the forest; bird calls are entirely natural³.

We exchange news. For Sergey the trapping is slow going. There are still few arctic warblers: only three have been caught, all males. It turns out that one of them is the very bird which came in first and now sings from Zhuzha's patch all the way to the camp. I record in my notebook the ringing details and then we go our separate ways. It is back to shadowing birds, spying on them, observing from one spot or while on the move. But for the rest of the day nothing really new happens.

11. THE HYPOTHESIS DOES NOT STAND UP ГИПОТЕЗА НЕ ПОДТВЕРЖДАЕТСЯ

For two days the willow and arctic warblers continue to behave strictly according to my hypothesis that one species will avoid contact (arctics) while the other will take no notice (willows). The number of arctics is continually increasing, and as it does so the males' territories decrease in size. Only that of the bird singing from four birches grows larger, to become more or less like the others. Now and again fights break out among the arctics, there are chases, and old boundaries dissolve while new ones appear. In consolidating the new boundaries the males adopt poses very similar to the threat display of the willow warblers. The arctics however flick their wings (rapidly half opening then closing them) more sharply and more often. The threat call, a buzzing chk-chk-chk, is also sharper and harsher.

The greater activity among the arctic warblers and their increasing conspicuousness have apparently no effect on the willow warblers. They continue as before to sing their tranquil 'broken' songs. All the arctics are by now singing mainly from the tops of the trees, just like the willow warblers. For the simple reason that the arctics have become more

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numerous, interspecific skirmishes also increase with either species attacking the other. But these encounters are nothing like the fights between males of the same species. Interspecific encounters are somehow almost good-natured and very brief, as if incomplete; the next second the two birds have flown off in different directions. As a result they get to know each other by sight as well as by song. A fleeting pose, the manner of flitting from twig to twig, the style of flight and various other features, not to speak of the specialised demonstrative stances, enable them - after a time, admittedly - to tell each other apart. Even the attitudes adopted by the singing males differ: the willow warblers lift their heads only very slightly, while the arctics sing to the sky.

One way or another, my hypothesis is becoming ever more inadequate and less satisfying. Soon it founders once and for all. The fatal blow is delivered on the evening of 9th June.

Koka is singing at the top of a birch in the middle of his territory, when just ten metres from him a male arctic warbler called Lazhik (L-A-Zh, standing for left-aluminium-yellow) bursts into song. For several minutes both males continue singing without noticing each other, since they are separated by the top of a tall birch. When Lazhik flies across to Koka's birch I am expecting a short chase as usually happens in such cases. Nothing of the kind. Koka silently watches Lazhik singing away on the next branch, nonchalantly scratches the back of his head with a claw, ... and also starts singing. It is such a clear demonstration, as if to convey a message especially to me.

What a surprise. Thank you, my dear Koka! And you, too, Lazhik, thanks a lot! I sit down on a fallen birch and have a smoke. Lazhik and Koka continue to sing on their common territory, now flying off in different directions, now dueting on one and the same tree. It is like being at the opera, when each singer has their own song, yet they are singing together. I don't go in for duets of that sort, they get on my nerves.

Damn it, now I must think up a new hypothesis.

So, here in the Subarctic Urals, willow and arctic warblers do not set up mutually exclusive territories. Moreover, as is now clear, it is not on account of the complex tiered woodland structure and denseness of the vegetation that confrontation is avoided and the species take no notice of each other. It is simply that they can distinguish their own kind, who are competitors, from the others, who are not. This is helped by the songs they use for advertisement.

ONE SEASON

So why on the Yamal Peninsula do they not distinguish their own kind from the others? Are they unable to? There is probably something in this. Ornithologists working there up to the 1940s wrote nothing about arctic warblers - evidently because they never saw them. They were discovered there in 1958, and since then have been seen and heard by everyone who has been there.

Is it possible that twenty to thirty years of the two species coexisting on Yamal is too short a time for them to learn to tell each other apart - leading to aggression prompted by mistakes in recognition. But here in the Subarctic Urals, where they have lived together for several centuries at least, they can recognise each other. It is true that they do quite often make mistakes here, but they soon correct them: chases are always short-lived. If this explanation is correct, then in a few decades, or perhaps centuries, on Yamal too the arctic and willow warblers will be sharing territories; and only sometimes, accidentally, they might get involved in unnecessary scuffles.

Well, that is a bit of guesswork, about what was and what will be. If here in the Urals the two warblers - closely related species - live together in the same forest, not isolated from each other, does it mean that there is something keeping them apart? In other words, perhaps they are not competing for resources. Otherwise they would be eating each other out of house and home, and surely Natural Selection would notice such an irregularity. As the theoreticians say, competition is the driving force of selection.

This is something for the future. Nestlings will make their appearance, and we shall observe carefully to see what their parents feed them with, and where they collect it. Only then will it become clear whether there is any competition.

Making up hypotheses is an amusing pastime. But they often collapse, like a house of cards. It only takes a certain Koka and a certain Lazhik to have a sing-song together, and at once a beautiful hypothesis bites the dust.

However, Koka is not all willow warblers, and Lazhik is just one arctic. We must inquire what other individuals think about interspecific relations and, more to the point, what they do about them.

During the morning of 14th June the number of arctic warblers in our forest sharply increases. A new wave of immigrants sweeps in and, like a wave on the shore, announces itself by the noise. The whole forest seems to be full of frantic sewing machines. Now and then the males

HYPOTHESIS

chase each other, scold and chirr. The territorial boundaries, which appeared to have stabilised after prolonged 'negotiations' between neighbours, are once more shifting around to the accompaniment of threatening noises from old and new residents.

There is no point in trying to map the territories: the situation is changing so unpredictably, and all the new unringed males look alike. After running around on the plot in a muddle, I sensibly come to a halt. Our small monitoring plot has clearly become unmonitorable. It would be better to reduce the area and then find out what is what, starting perhaps from right here, where I happen to be, under the singing Lazhik and Koka.

Lazhik's territory has become considerably smaller, as he is squeezed by two new neighbours. Lazhik battles heroically, driving away first one then the other from his home ground. Now and then he also flies around the patch not yet encroached on by the newcomers - where the large willow trees stand on the river bank, and where there are those very birches in which he and Koka recently demonstrated to me so graphically their mutual loyalty.

Now they meet again in the same birches. The worked up Lazhik flies menacingly at Koka who, evading the attack, flies to the next branch, from where he stares flabbergasted at his suddenly bristling old acquaintance. Lazhik already realises that he has put his foot in it, but apologies are not the done thing in such circles. He flies to his southern boundary, where two new and very cocky males are already dividing up his (his!) territory between them.

A fight starts on the spot, every bird for himself. And here on a spruce, where Lazhik was singing just twenty minutes ago, he is defeated and retreats into the depths of his territory to chirr threateningly at his victorious neighbour; but he does not launch any more attacks. Continuing his wing-flicking he continues expressing his dissatisfaction with the situation for some time, and then flies to the position, in his former territory, where the other insolent new neighbour is singing. What happens there cannot be seen. But, judging by the uninterrupted singing of the newcomer and the querulous chirring of Lazhik, it seems the latter does not dare to attack and contents himself with brandishing his fists when the fight is already over. So far as they are all concerned, the act of annexation is to all intents a *fait accompli*.

It is time to ring the new arrivals, and so I unfurl the nets. But there are frequent distractions as I continue trying to spy on the warblers' tempestuous lives.

12. MUSTANG MYCTAHF

The arctic and willow warblers are not as similar as they might at first seem - very different in fact. It is not simply that, as one field guide shows, the willow warbler's first primary feather is longer than the wing coverts, while in the arctic warbler it is shorter; nor that the arctic has a faint bar on the wing which is lacking in the willow warbler, as shown in another field guide. After we had caught and ringed dozens of warblers, and observed them day in day out with and without binoculars, we learnt to tell them apart at first glance. Yes, they certainly are different. Overall the arctic warbler is slightly larger-eyed, larger-billed, larger-headed, and a tiny bit greener than the willow warbler. And if *we* can tell them apart, surely they can too. Occasionally we make mistakes - but then so do they.

Still, no two willow warblers and no two arctic warblers are exactly alike. Each bird is an individual personality. Take Koka for example, he is trusting. Zhak on the other hand is an intriguer and trouble-maker. Among our new arctic warbler acquaintances Pak ('PAK' - right-aluminium-red) is notorious for the fact that within one half hour he allowed himself to be caught three times in the same net, each time getting his tongue thoroughly caught. Disentangling him gave a great deal of trouble, since the tongue is like an arrowhead with 'agnails' which prevent the threads slipping off it.

But the most squeamish individual is an arctic warbler who is so difficult to catch that he has acquired the nickname Mustang¹. He seems to be more cautious than even a capercaillie², in Russian a *glukhar*³. The name means 'deaf', since for several seconds while it sings it cannot hear anything. Mustang however always has excellent hearing, and will not tolerate our presence - rather unusual behaviour for a warbler.

Having an unringed singing male on the plot is a real nuisance. It makes it difficult to work out many of the details of the arctic warblers' lives. Moreover our self-esteem as bird catchers does not incline us to tolerate the situation indefinitely. We are narked and ill at ease.

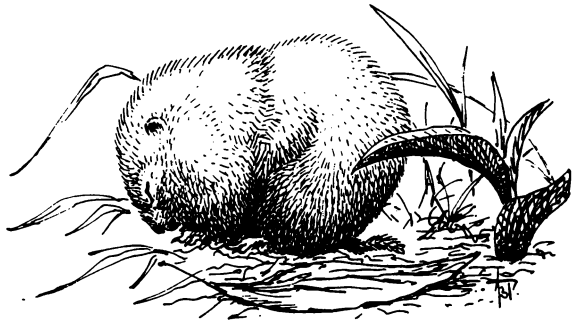
This is how one day we come to mount a massive campaign against Mustang personally. In the quiet of night we put up all our nets on and around Mustang's territory. That accomplished, Sergey goes off on a routine search for nests while I settle down under a birch tree and remain as still as a statue in the expectation of a triumphant capture. My attention wanders from the task in hand and I give myself up to undisturbed contemplation of the surroundings. Such an aimless activity

MUSTANG

has its own charm. You simply sit and gaze; but at the same time you are, with a faint subconscious excitement, expecting something - even though more often than not nothing noteworthy does occur.

All around is silence. Dawn is about to break. I sit quietly in my camouflage clothing and try to be unobtrusive.

At the next tree a vole gnaws at the vegetation, then for a long time fastidiously washes himself. He does it in a great hurry, as if afraid that he won't manage to get somewhere in time. But no, he is not hurrying anywhere. This is the normal way of doing things for a small mammal which simply lives his whole life at breakneck speed; all his three score years and ten are crammed into a few months. Then, although having scarcely completed his toilet and without moving off, the vole suddenly falls asleep, burying his nose in the ground. It looks odd. Usually we imagine a vole always being timid and taking refuge from something. But this one shows no such anxiety.



A brambling has evidently only just woken up and flutters in from somewhere to land on a twig, and stretch, and yawn. It looks very human - the same early morning clumsiness and shivering from the cold. It occurs to me that it has the same uncertainty of feeling as has a Sunday morning idler with no idea what to do, and no cares left over from the day before.

My placid state as a disinterested observer is now interrupted by Mustang, who begins to sing from the tree tops in his spruce patch. He reminds me of the main reason for my vigil and I scan the dense spruce branches, but cannot see him. If he comes down lower I'll drive him into the nets.

For a long time though he does not leave his post, and the monotony of his song begins to get on my nerves. While keeping one ear on Mustang I look around. The brambling has flown off somewhere. I try to spot the vole: he has had a nap and is now once more gnawing at something, sitting on his haunches and holding the something in his front paws with his jaws working up and down at a furious rate. I try to move my own jaws at the same speed - but it is quite impossible. I smile

ONE SEASON

at the eccentricity of my own behaviour, even if the same action is perfectly normal for the vole.

All of a sudden he darts off behind a tussock. With a slight rustle a grey shadow sweeps in. On the spot where just a moment before the vole was grubbing, a hawk owl³ lands. I hesitate even to blink. The owl, lurching from one foot to the other with a waddling gait, investigates the tussock and comically stretches out its surprisingly long neck while peering under a low shrub. How beautiful it is. I have never seen an owl so close before. It seems perplexed, with a blank look in its lovely great eyes. But now it turns its head. Our eyes meet....



It is probably only a fraction of a second, but it seems ages that we stare at each other. The owl's eyes grow even larger. Then, looking confused, it blinks, moves its head horizontally like an Indian dancer, jumps up, and flies off to a spruce some way off, where no doubt it hopes to recover its composure after such a fright.

But it is not so easy for the hawk owl to find somewhere to get its breath back in peace. It has a very obvious predatory look - bright yellow eyes, horizontal bars on its breast and underside, and even a long tail

MUSTANG

quite unlike an owl's. Added to that its flight is rapid and agile. In all ways this owl is like a hawk, hence its name.

The brambling appears near it, and two redwings pop out from the undergrowth. They are all calling and swooping down on it, the thrushes even stabbing at its head as they fly past. Unable to withstand such an onslaught the owl flies off to another perch, this time nearer to me. It alights on a branch sticking out of a birch trunk. The thrushes leave it in peace but the brambling flies after it, and a few more small birds make their appearance. Among them are the willow warblers Koka and Zhuzha, and the arctic warbler Pak. Now another arctic warbler joins in the fray, this one without a ring. It is, of course, Mustang.

Either the owl is not willing to put up with the attacks of these avian small fry, or it is put off by me moving the binoculars as I try to see the warblers' rings; at any rate it is no longer inclined to be stared at and so flies off. But Mustang is here! My whole body tenses ready for action, but how to act I haven't yet decided.

The small birds fly after the owl, with only the two arctic warblers remaining behind. The next moment one of them flees from the other and lands in a net. It all happens so quickly that I do not notice who was chasing whom. However, it seems clear enough: Mustang must have been chasing Pak out of his territory. And now Pak is hanging helplessly in the net while Mustang continues to chirr threateningly at him from a nearby bush.

It suddenly occurs to me to try a method used many times before. Stealing up on Mustang from behind I fling my cap at him. This time though it does not work. Clearly Mustang has iron nerves: cool as a cucumber he lets my projectile pass by him, and then drops down a little lower to have a good look at the unusual flying object, now floating in a puddle.

I have an odd presentiment that here is no timid little bird, but some powerful, proud and independent being, reincarnated for a while as a warbler, while I am merely an insignificant little humanoid prancing around him with my stupid antics. I fancy I see a cynical smirk in Mustang's gaze. So that is your attitude, is it? Becoming a little annoyed and not at all in a joking mood I take off my jacket to serve as a higher-calibre missile. But Mustang casts a withering look at me and flies up to sing from the top of a spruce tree.

Pak is still hanging quietly in the net. He has witnessed my humiliation in full but expresses no contempt; he merely hangs and stares. But as I approach him, he sticks out his tongue! - and

ONE SEASON

immediately gets it entangled. I pull out a pair of fine forceps and take a long time to disentangle him with hands still trembling with indignation at Mustang. Pak I can understand: he too feels sore about Mustang. Out of the kindness of his heart and in true neighbourly fashion he helps drive the owl out of Mustang's territory, and instead of being thanked is chased into a net. I let Pak go with a feeling of profound solidarity and return to my place under the birch. Grumbling, I wring out my hat.

But I cannot sit still any more, and have frightened everything away with my chasing around. Meanwhile Mustang continues singing up above. I go and look at the nets which are arranged in a broad belt around the approaches to Mustang's territory.

At one of the nets I see Sergey. In his hands he is holding his folded cap from which protrudes a round head, glittering with the familiar yellow eyes, and there too are the grey tail and feathered feet with black curved claws. It is a rare event to catch something so big. Birds larger than a thrush usually just fall out of the net's pocket as soon as they start struggling. We carry no large rings with us, so it means going back to camp. We must spend a little time on this unfriendly brute. Experience can be a great help in any kind of work, and in handling owls we have little enough. Moreover Sergey has already suffered a shock: the dear little owl managed to stab his finger. In grasping him with its foot it punctured the skin in four places, just as it would with a mouse.

It took two days to catch Mustang, when I had already given up hoping that he would cooperate with us in our work. To this shadowy individual I gave two black rings - but he kept his familiar nickname.

Thereafter it was as if Mustang had been replaced by another bird: he became very trusting. Or, more likely, he simply took no further notice of us. It is true that one day he did come down from his favourite spruce trees to have a good long stare at me. Perhaps he wanted to gaze again at this strange great creature who once had the chance to eat him, but refrained.

Among the willow warblers small adjustments took place. In the course of doing a routine check of the territories, I was unable on one occasion to make out the yellow ring on Pyzhik's right leg. But it was not Pyzhik. A newcomer had appeared on the territory, and I had not seen him taking up residence. Another part of his new domain took in some of the former territory of Zhuzha. But nothing outrageous had occurred - all

VOLES

three were singing peacefully. If I had come a little earlier I would probably have seen how Newcomer had established a footing, and how Pyzhik and Zhuzha had yielded some of their ground. Apparently they were not very assiduous in defending their patches and soon became reconciled to the new situation. It seems that family cares were more important to them than squabbles with a very self-confident male. Good luck, God be with him.

Put in scientific terms, Pyzhik's and Zhuzha's territorial dominance had weakened, while that of Newcomer was intense. So it is not hopeless for homeless males to continue wandering through others' territories, continually testing their owners' resolve, and now and then getting a thrashing for their pains. As they say, nothing ventured, nothing gained.

13. VOLES

ПОЛЁВКИ

We tried to remain on good terms with the creatures around us. Among them were the northern red-backed voles¹ which lived around our tents - such charming little mouse-like animals with reddish fur, a short tail and small ears. Sitting around the camp fire at a stout little table made of spruce blocks, we often saw our quiet unassuming little neighbours. There were at least four of them. They lived under a large, curiously shaped, mossy mound marking the site of a tree which had stood there heaven knows how long ago. The tree had fallen over and become a moss-covered log, while the stump, half wrenched out of the ground, was now a mound looking something like an octopus made of moss. And now, at the far end of the log, we regularly poured away the water from the saucepan in which we had cooked our rice.

The cloudy water, which had become a sort of white kissel² in a shallow depression, was to the voles' taste. Now and then they would poke their whiskered faces, each with its pair of little bulging black eyes, out of the hole in the mound, emerge from their refuge, and make for the rice broth. For this purpose their favourite path was along the log. It took them directly from their living quarters to their dining table where they would busily occupy themselves with the food, snorting and champing furiously.

The voles became more and more accustomed to us, and lost their fear. They no longer hesitated to show themselves even when we were chopping wood just two or three yards from the fallen tree. It was

ONE SEASON

curious to see how these plump, puffed up little creatures climbed up onto the log and were immediately transformed into well-proportioned animals dashing along their log road. Their centuries-old dread of open spaces forced the voles to make their way along the log, if not as fast as they were able, then at least at a run. Here there was a higher probability that they would be caught by some predator or other. Yet the log was a convenient route since it meant they had no need to go around obstacles such as bushes, mounds, fallen branches and such like. So here they were, compromising between their natural fears and their desire to get to the tasty broth as fast as possible, racing along the exposed but shortest route.

A deep path was soon formed along the moss on the log. Then we noticed that the voles were always going along the log in the same direction. We found another path. It ran along at a lower level, through the mouldering wood and moss below the upper path. This was the way back for the satiated. There was no need to hurry, caution was paramount, and they chose the more secure route.

The rice which we bought in Kozhim was certainly not of choice quality, but there was simply nothing else available. Accordingly our rice *kasha*³ contained uncleaned rice grains, grey hemp seeds, orange millet, and seeds of various southern weeds of diverse shapes, sizes and colours. There was no time to pick them out. Reconciling ourselves to the situation we uncomplainingly gulped down all these inclusions with the rice, except of course for stones, which we spat out with a few oaths. Fortunately there were not so many of these, and our teeth did not suffer.

Time after time we began to notice that the proportion of black grains - even to the naked eye - was steadily increasing. Not being experts on the seeds of rice field weeds, we made no attempt to investigate further, attaching no significance to the strange phenomenon.



VOLES



One day, when I was reaching into the bag for the usual ration of rice, a frightened vole leapt out and in a panic darted under the brushwood flooring on which rested all our goods in the storage tent.

So much for the seeds and weeds! Our pretty little voles had been behaving just like any ordinary mice. It turned out that the slimmers' rice broth far from sufficed as their sole daily food source. True enough, one ought to have variety in one's diet. They too decided that the menu should be varied - not only theirs but ours as well. Selecting the white grains from the bag, they left behind their own contributions - similar in size and form, only black - as replacements. Our only consolation was that the new items were not as numerous as the ones they had stolen. They had treated the bags of millet, noodles, peas and rusks in similarly brazen fashion. If a bag was tied they had of course gnawed through it. Strangely enough, the sugar was not to their taste.

Even more odd was the fact, seeing that we were engulfing vole droppings along with the food, that we noticed absolutely no difference in taste. It all went down together. But now that the mystery had been solved, our attitude to the 'weeds' underwent a sea change, although it cannot be said that our appetite was seriously impaired. We just occasionally thought or remarked to each other that there was something rather unusual about the *kasha*.

We knew well enough that the northern red-backed vole freely climbs trees, clinging to irregularities in the bark with its claws. However, we would be taking disproportionate measures against these minor miscreants if we mounted our grocery store on polished tree trunks, like those built by the local taiga people to guard against wolverines⁴ and bears.

We were driven to treat the voles as if they were incorrigible criminals. We had to acknowledge that they were also guilty of other misdeeds: voles wreak havoc in some birds' nests, making off with the eggs or gnawing the nestlings. For some reason they also persisted in carrying peas (only peas) into my (only my) sleeping bag, turning it into a pea store. I did not always discover these little donations in time, and

ONE SEASON

sometimes it was not until morning that I found that I had been sleeping on peas. It is obvious enough that I am no princess, so why was it necessary for them to test me so often? It is odd that they never had any doubts about Sergey.

From a thick offcut of spruce we set up a massive block furnished with a catch made from a thin splinter, and a margarine-covered rusk as bait. The device was to work automatically. When it fell with a thud onto the victim it seemed as if the whole Kozhim district shook sadly. Carrying out the sentence took several days. There turned out to have been six of them. After that the propped up block stood for a long time by the store tent as a mute threat, like the head of some crocodile-hippopotamus hybrid, narrow-tongued and toothless.

It is not easy to love nature in all its manifestations.

14. NEW MYSTERIES

НОВЫЕ ЗАГАДКИ

The longer I observe the warblers' relationships, the clearer it becomes that Koka and Lazhik are showing the standard pattern of behaviour. Time and again I come across arctic warblers contentedly singing away right beside willow warblers who are similarly at peace with the world. It is true that fights and chases sometimes break out, but they quickly subside. It is always the same - cases of mistaken identity.

On 20th June I make a start on the systematic mapping of the territories. In the last few days there have been hardly any changes in the willow warblers - just the appearance of the new recruit beside Zhuzha and Pyzhik.

Things are not so simple with the arctics. They are still engaged in redrawing their boundaries in places. Sometimes I have to correct boundaries plotted only the day before. So as not to get bogged down in these corrections and to speed up the mapping, this time around I do not refer to the maps made a couple of days ago.

Sometimes I cannot resist the chance to find out something new about the arctic warblers' lives. But it is essential to maintain an iron determination, since a comprehensive map of the territorial situation is a *sine qua non*. It would be ideal if mapping could be instantaneous: click! - taken like a photograph. Alas, that is just as impossible as having a magic map to locate fungi¹, or hares in cover. It has to be faced: there is no avoiding the painstaking plotting of the points one by one, while negotiating bushes and penetrating thickets.

NEW MYSTERIES

For six days I plot the new map. On it there emerge, seemingly arranged in no order at all, unambiguous polygonal territories in two colours - red for the willow warblers and green for the arctics. The red territories are separated from each other, and the green from the green. But the red lines nearly always cross green ones, and green polygons are superimposed on red ones. It means that the territories of the two species in no way exclude each other. There is absolutely no interspecific territoriality. The short-lived skirmishes between the arctics and willows have no influence on the disposition of the territories.

The willow warblers have already had nests for a long time. The arctics too have nests, though admittedly some of them are not yet completed, or the first eggs have only just appeared. Anyway, both species have their nests, and since their territories overlap, it means that arctic warblers' nests are not only in their own territory but also in a willow warbler territory; and *vice versa*. Neither species prevents the other settling wherever it feels inclined. The arctics have taken up residence practically everywhere in our plot: the whole area is divided up into their territories, with the sole exception of the large clearings, which are not to their liking. And just as in the willow warblers, neutral zones between the territories are guarded by neighbouring arctics.

I sit at the edge of the willow thicket and study the map, only just finished. It gives plenty of food for thought. Why, for instance, has the map turned out to be so different from the one on the Yamal Peninsula? There the two species' territories do not overlap. Perhaps the reason is that there are fewer of both species in Yamal than there are here. They are certainly thin on the ground up there, and it is clear that the arctics simply occupy the empty spaces left by the willows. It goes without saying, no-one likes being attacked, whether deliberately or by mistake, even if for only a short time. And if there are empty spaces, why on earth not take them? That is the easy way out.

It seems logical enough. So, what if, in the course of evolution...?

No, wait a moment. There I go, day dreaming again. It'll only take a Koka and Lazhik to come along, and that'll be an end to all this speculation about evolution.

A bluethroat settles on a twig not far from me and immediately starts singing, 'ee-aa-ee-aa-ee-aa-ee-aa.'

'Hullo, Ee-aw, how's life?' - I turn to him and catch myself imitating Winnie the Pooh². Our new acquaintance, Ee-aw, has a thoroughly asinine song. 'And where did you pick up your repertoire, you plagiarist?'

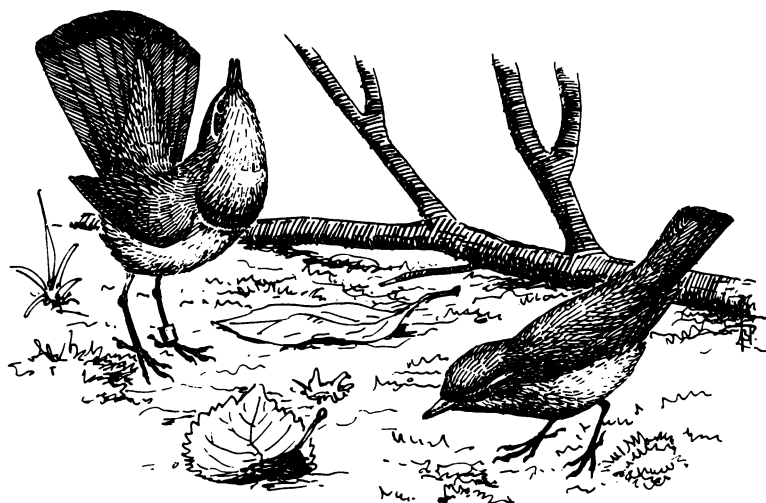
ONE SEASON

Where indeed could this Ee-aw have heard an ass? It is well known that bluethroats, which breed over most of this vast land mass and include in their songs all kinds of sounds, spend the winter in Africa and southern Asia. Where exactly our Urals bluethroats fly to in the autumn, no-one knows. A group of us in the Urals and neighbouring areas catch and ring hundreds of bluethroats every year, but we have never yet had a ring returned or received information about any of our birds. It would appear that most of them do not fly across Europe, where there are many bird observatories, but go somewhere else where ornithologists are thin on the ground, so that if someone does catch small birds, any rings found are simply thrown away or kept as a memento. And asses are everywhere in the south.

I charge Ee-aw to find, in the far south, some ornithologist and show him the ring with 'Moscow' and the number on it³ - the ring we gave him only recently. And it has to be an ornithologist, not the first Hindu or bushman he comes across. Heaven knows what they might do with it.

But Ee-aw is no longer in front of me. He has stopped singing, and like a peacock has raised and spread out his red tail edged in black. His beak points aloft, and his whole body is strained upwards, almost as if he is standing on tiptoe on the branch. His blue dicky with the red patch in the centre is shot through with a satin sheen.

Aha, now it is clear why he is putting on such airs. On the ground under the bush a female is feeding. Ee-aw flies down and continues



REGIME 24-12

displaying his dreamcoat to the female, trying all the time to place himself in her path. Now and then from his raised bill emerge some indecipherable hoarse sounds, rather like an intimate version of his song. The whole of Ee-aw seems to have turned into a little blue flag - so brightly does his breast stand out against the background. What a dandy he is, what a fop!

The female, however, for whose benefit the male is putting on this performance, seems in every way entirely indifferent and otherwise occupied. She feeds. Then Ee-aw also begins to feed. They move away through the willow patch in short bounds, all the time engaged on the chore of collecting the daily ration.

Watching them I begin to feel hungry myself. Our working day has come to a close. The sun, rising from behind the mountains, has warmed up the insatiable hordes of mosquitoes which are now making life uncomfortable for us. And I need some sleep.

15. REGIME 24-12

РЕЖИМ 24-12, ИЛИ КОЕ-ЧТО О БИОРИТМАХ

In the Arctic we have got used to working in what most people would consider a pretty odd routine. Our 'day' is one and a half times the length of an ordinary one: we sleep twelve hours, and work for twenty-four. The ratio, however, of sleep to wakefulness is quite normal, being 1:2, and so the weird arrangement has no deleterious effects on our general feeling of well being and our capacity to work. Even so, why do we need it? A doctor or physiologist might reproach us for ruining our health. And it is true that the twenty-four hour rhythm has been perfected over thousands and millions of years. Now we are disrupting that rhythm, imposing an anomaly on our bodies. When we return to human society we shall have to adjust once more, placing yet another burden on our physiology.

How can we answer that?

For a start, it should be pointed out that in nature there are many exceptions to the twenty-four hour pattern. Small mammals, and shrews in particular, are one such. If these smallest of the mammals attempt to sleep for a long time, they quite simply die of starvation. This physiological characteristic of small warm-blooded creatures obliges shrews to bed down and then get up again many times every day. Run around - eat - sleep - get hungry - run around feeding again... day and night, summer and winter.

ONE SEASON

Organisms living at the edge of the sea, where tides are the dominant influence, also have a special rhythm adapted to the regular flooding, or alternatively the regular drying out, of the shore. For example, in the polar seas gulls are more active on the ebb, when the sea is leaving stuff behind on the shore. It is of no consequence whether it is day or night. The cycle of the tides lasts about twelve hours twenty-five minutes.

It is true that many animals do observe a twenty-four hour cycle of sleep at night and activity during the day - or *vice versa* if the animal is nocturnal. This rhythm is called 'circadian'. However, the reason most animals keep to this pattern is not on account of it being necessarily the best cycle for them. It just happens to be the periodicity with which Mother Earth turns on her axis, so that we on her surface are stuck with it, generation after generation, century after century.

No doubt many people have noticed that they do not always succeed in falling asleep at exactly the same time every day. This is not at all because circumstances do not permit, or something is preventing it. It may simply be that you don't feel inclined: you read, loll about, or turn things over in your mind. If there is something interesting to do in the evening, then it is easier to stay up late and forget about going to sleep. But then, come morning, getting up at the requisite hour is not easy.

Working on the tundra in twenty-four hour daylight, I have tried on many occasions to keep to the normal routine, but something always upset things and the working day grew ever longer. Then we tried experimenting: why not work for as long as we remained effective, then sleep as long as we wanted? It worked fine. That is how, easily and spontaneously, a routine arose based on demand. Only then did we notice that our new 'days' were always around thirty-six hours long, sometimes a little less, sometimes a little more.

I'll swear that, both at the beginning and at the end of our expedition season, we feel perfectly normal. We have not always worked together just as a pair, Sergey and I, and have been able to observe how other colleagues on expeditions have reacted to our routine. Most have adapted easily to it, and have not tried to alter it. For some, however, it has been more difficult.

One of our colleagues, believe it or not, always felt sleepy at four in the morning, and the feeling would last about half an hour. He only needed to endure it or have a short nap for a few minutes, and then he was fit for action once more. Another was unable to sleep for long, in fact could never sleep more than nine hours. He would get up and do something, and if he did not leave the camp it got pretty exasperating for

the rest of us. He would naturally be hungry, so he would start a fire going, snap firewood and clatter around with mess-tins and spoons. In short, it was quite impossible for the rest of us to sleep. He still assured us that he did not need any more than nine hours, but promised to go without sleep with the rest of us. The whole twenty-four hour period, and longer, he went without sleep. And in fact, for the first few days he selflessly stuck to it, but then collapsed and slept for a full day without even getting up to eat. After that he was completely 'one of us', and had made the transition to the 24:12 regime.

We later found out that we were not the first to think up the extended day. Among the Nenets¹ reindeer herders, a spell of duty lasts twenty-four hours, after which another herder takes over and the one coming off rides back to his *chum* to sleep it off.

One day Sergey came across an article in a newspaper. It was all about an experiment carried out by doctors in a cave near Ternopol in western Ukraine. Two volunteer speleologists, who were also doctors, went underground. They were given instruments to monitor their health as well as essential equipment and food to stay alive. However, they had no clocks or other means of telling the time. Communication with the outside world was one-way: before and after sleeping they reported, through a telephone, their physiological measurements and analyses.

Having returned to the surface they discovered that, several days after going underground, they had adopted a thirty-six hour regime. Their physiology was quite normal, and they had managed to work productively all the time they were in the cave. They had no complaints about their health. In fact they were underground for a month, although by their own reckoning it was only nineteen days.

We read this article with great interest, even with delight and some pride. Yes, indeed. For we, even with clocks and the sun, had divined the body's requirements and gone along with them.

It means that, despite the approximately 16:8 rhythm to which we are bound by astronomy and the centuries old burden of our history, our bodies can themselves adopt another more suitable regime.

Later we came across other literature concerning speleologists' biorhythms, and discovered that not all have a spontaneous thirty-six hour rhythm: some do not fit the pattern, and periodicities can range from twenty-four to forty-eight hours. But no-one, it seems, had a cycle shorter than twenty-four hours. There were also other facts - including our 'difficult' colleagues, and papers on the physiology of biorhythms - which challenged our faith in the anomalous 'days'.

ONE SEASON

Even so, there is something in these thirty-six hour 'days': they are undoubtedly practical for the work and daily running of an expedition. We work with birds. The majority of them, even if they sleep at night, do so far less than we do. If we followed their sleeping pattern, we would soon become exhausted just in the first few days of the field season. We are impotent against the human brain's natural requirement of so much rest.

The short night of the birds is that small portion of the day when they are sitting particularly tightly on their nests, incubating the eggs or protecting the nestlings against the night chill. Most birds allow a very close approach to the nest at night, flitting out right from under one's legs. This is the reason why we hunt for nests mostly at night. On the tundra, where all birds nest on the ground, nocturnal nest-hunting is the most productive. And our warblers, the present subjects of study, also nest on the ground in the taiga.

If you study birds, it is essential to observe them at all hours, and our extended 'day' allows us to do that. After working for twenty-four hours we have a break for half a day, sleeping. But then the following 'day' is once more a full twenty-four hours. It is also a convenient arrangement when we are monitoring any tundra area by travelling across it. A large section can be covered in twenty-four hours, and the frequency with which we have to set up camp is cut by a third. It also means that the number of stopping places is correspondingly reduced. This saves the time needed to find a camp site, prepare it, pitch the tent and make the fire, then take the tent down, pack the equipment and clean up.

We cannot honestly say that, having advocated the 24:12 routine, we always stick to it rigidly. On the contrary, we often infringe it - by extending the day even more. Sometimes this happens at night, when nest-hunting is urgent, and sometimes in the early morning, when the birds are most active and certain observations need to be made.

Whatever we do with our working time, and however much we may scoff at our biorhythms, we are thankful that with light around the clock we can use the time as we like. Night cannot dictate its terms. We take with us no torch, candle or kerosene lamp. Gathering dusk does not oblige us to rush back to camp to get it ready for a normal night's sleep. We are not worried about getting lost in unfamiliar terrain when night falls.

How on earth do those poor people in the tropics put up with the inexorable alternation of a twelve-hour day and an equally, terribly long night?

16. THE ELEMENTS SET UP AN EXPERIMENT ЭКСПЕРИМЕНТАТОР - СТИХИЯ

One night - and this time it really was night-time - we were woken up by the booming crash of a falling tree. There was a furious noise in the forest. Through the general uproar could be heard heart-rending creaks and moans, the thumps of branches falling on the tent, the nervous shaking of the nearby birches, and the whistling of the wind. We tried to get back to sleep, but without success. A strange anxiety seemed to have permeated the whole surroundings, ourselves included. It became unbearable.

When there were two more crashes not far off, I began to think about the trees right next to the tent. Somehow I was reminded of the voles which had been crushed under our block-trap, and felt sorry for them. I put on my clothes and went out. There were no signs of life. Even the mosquitoes had disappeared, although it was comparatively warm. It is usually quite calm under the forest canopy, but now chaotic gusts of wind were penetrating the inner sanctum. Last year's brown leaves were darting across the path like frightened mice, now left, now right. The tops of the birches leaned to the west, their thin branches flapping desperately. Sullenly and as if doomed, the spruces swayed and moaned.

Satisfied that none of the trees by the tent was about to fall on it, I felt a bit calmer and set off to locate the tree which had woken us up. It turned out to be an enormous spruce by the path to the river. It had been uprooted and laid out from east to west. Stones and clods of earth were still falling from the newly exposed roots. One root had remained intact, but it too now cracked and gave way. Torn off branches were scattered all around. They were bare and beautiful. How many years would pass before the massive trunk of this tree would lose its needles and branches, and become a mossy log scarcely projecting above soil level? I had read somewhere that in the northern taiga it takes something like sixty or eighty years.

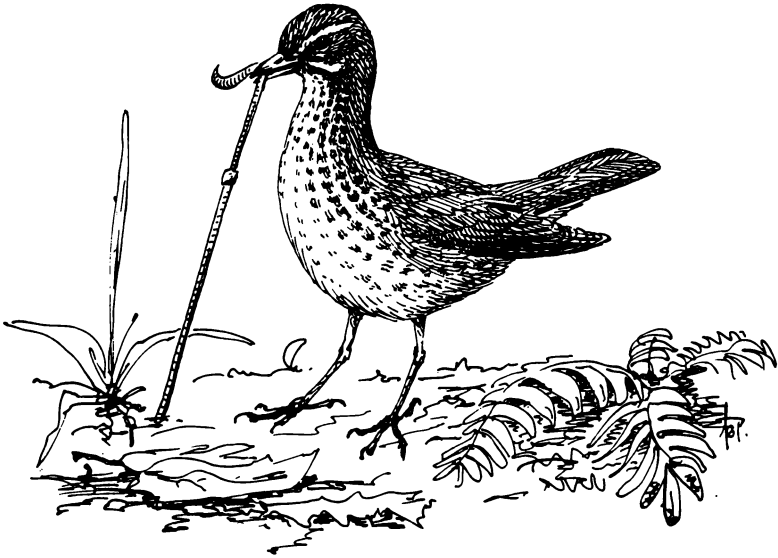
When I returned to the tent and got back into my sleeping bag, Sergey was evidently asleep once more. He showed no reaction to the din I was making. If it were not for the noise in the forest, I would probably have heard the relaxed breathing coming from his bag and have fallen asleep myself. But there ran through my head, one after another, memories of terrifying fairy stories I'd read as a child, and half-philosophical, half-sentimental thoughts about the transience of life.

I awoke in time for breakfast. Sergey, attempting to imitate the youthful Robertino, rendered in a strained voice, 'How brightly shines

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the sun after the storm!...' - and collapsed in a fit of coughing, either from the smoke or from the strain on his vocal chords. It was true: the sun was shining brightly. The smoke rose calmly into a cloudless sky. The resurrected mosquitoes were once more whining hesitantly and discordantly. As if nothing had happened the birds were in full song. It was a typical picture of tranquil nature.

All over the path to the river lay the scattered wreckage of branches, bunches of needles, leaves and spruce cones. Just here a business-like thrush jumped out. It sprang forward two or three times, stopped, gazed with one eye at the ground under its feet, pecked at a leaf, threw it aside as if annoyed with it, sprang forward again this time back to front, once more froze for a moment, then suddenly pulled from the earth a long earthworm - and off with it to the nest to feed the nestlings. Thrushes



do not like dense vegetation, so they prefer feeding along our path. When a thrush jumps through fallen leaves, the disturbed worms and other inhabitants of the leaf litter try to hide under it, but in doing this they actually give themselves away. The thrush which freezes after a jump has spotted or heard the movement, sends the leaves flying and catches the victim. This is how various thrushes and waders feed.

After that, summer took its course. In retrospect the storm seemed merely a flash in the pan.

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That day we came across fallen trees several times. They were mainly large spruce which, being taller than the others, projected above the canopy and so took the full force of the wind. Some of them had been broken off part way up: the top half lay on the ground pointing west, while the lower half still stuck up out of the ground, looking rather ridiculous. One very tall spruce had come down - one of those from which Mustang loved to sing. He himself was singing right here, from the remaining spruce trees, between whiles ransacking one twig after another and replenishing the energy he had lost during the disturbed night with new calories in the form of small crawling and flying creatures.

A cuckoo flew in to settle on a branch like a bent post and began looking around - evidently in search of a nest. A white wagtail¹ which had arrived with the cuckoo took up position at the top of a nearby spruce, flicking its tail, shuffling its feet, turning its head, and calling incessantly. A brambling appeared close by, fluttering from twig to twig and calling agitatedly.

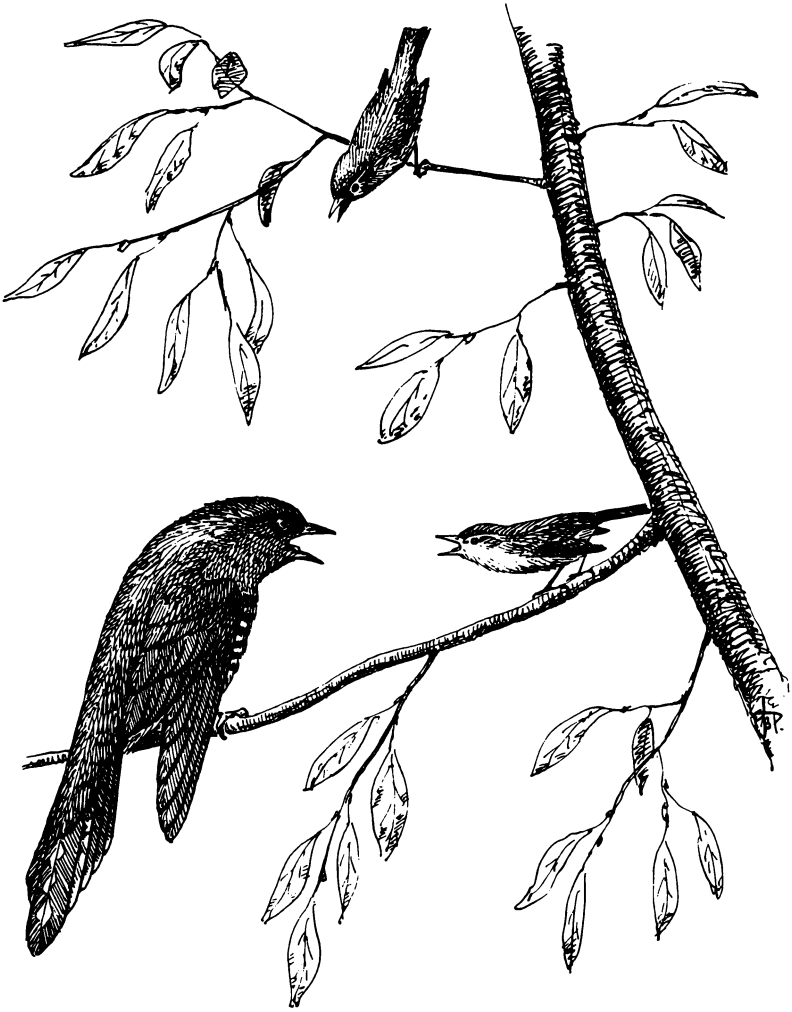
The avian small fry do not care for the cuckoo - with good reason: she will find a nest and seize the opportunity surreptitiously to lay an egg. Out of it will hatch a misshapen lout of a nestling with a bright orange gape, who will throw all the legitimate nestling occupants out of the nest. Then there is the food for this insatiable monster.

Outwardly the cuckoo looks like a sparrowhawk², with its long-tailed predatory appearance and horizontal barring on the underparts. Clearly this is why the smaller birds react to it in this way, as if to a predator. But the phenomenon has not yet been adequately studied. Moreover the reactions to cuckoos by birds within one and the same species may not always be the same.

Cuckoos go in for specialisation: each female parasitises the nest of a restricted range of passerine species and lays eggs resembling those of its host. However, the resemblance between cuckoo and host eggs is never perfect, and the eggs are also of different sizes. Quite often the host can tell them apart, and throws out or pecks the cuckoo's egg, abandons the nest, or buries the foundling egg along with its own under a new layer of nest material.

What prompted nature to clothe the cuckoo in sparrowhawk garb? One hypothesis purports to explain it, to the effect that birds attracted to the male cuckoo to mob it leave their nests unguarded, and meanwhile the female cuckoo lays a 'time bomb' in one of them. But the problem with that is: the female cuckoo is also hawk-like. No, it doesn't add up.

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But those pestering little birds certainly give the cuckoo plenty of bother, and it would have good cause to complain of its fate. True, it is probably fairer this way: if the cuckoo is going to save itself the bother of bringing up its offspring, then let its search for acceptable foster-parents be made a little difficult - so that life should not appear to be a bed of roses.

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In response to the calls of the wagtail and brambling, a willow warbler flies in. It looks like Koka, but from a distance it is not easy to tell. There follows another willow warbler. Both keep up squeaky buzzing calls which I have never before heard them make. Evidently they are a special signal, 'Cuckoo!' The warblers perch beside the cuckoo and, spreading their wings, carry on making this tiresome noise. Now and then one or other of them bravely attacks the cuckoo, trying to peck it on the head, or perhaps only pretending that it wants to peck. The cuckoo merely turns from side to side slowly and ponderously, like a bulldozer, with its bill wide open. The noise gets louder and louder. A pair of bramblings, male and female, turn up. Yet another warbler arrives, giving the same nasal buzzing call. This time, though, it is an arctic warbler - the first discovery of any similarity between the calls of the two warbler species.

The cuckoo cannot stand it any longer. It appears to dive down, then levelling out in flight it heads for the river. The whole noisy retinue follows in its wake.

Sergey and I encounter each other at the far end of the study area. We sit on freshly fallen branches and swap news. Properly speaking I have none to relate. All the males, both the willow and the arctic warblers, are singing in their accustomed places. Having successfully survived the storm, they all appear to be consumed with one object - affirming the bounds of their domains once more. It is as if the wind had blown down invisible fences known only to their owners and their neighbours, and now the gaps must be repaired.

'And Pyzhik is still singing,' says Sergey in a tone somehow conveying special significance.

'Still singing. Why shouldn't he be singing?' I ask, puzzled.

Sergey rises and beckons me to follow. In Pyzhik's territory he is singing just as he was an hour before when I came this way. But I had not examined the nest. It turns out that during the night disaster struck. By chance one of the trees, a tall spruce, fell right next to the nest. One of its side branches whipped the nest, and being springy flung it to the ground. Along with the broken eggs, smeared with feathers from the nest lining, Sergey had found the female - dead. Holding her for a moment in his hand, he placed her back on the wrecked nest, or more exactly on those scattered tufts of grass and feathers which were all that remained of the cosy and skilfully constructed *shalashik*³.

As it happens the storm has set up an experiment for us. We only need to take the trouble to observe the consequences, since the elements have already accomplished all the active and lugubrious part of the procedure.

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Whether males generally remain on their territories when the nest is destroyed we already know: they stay. Nature conducts such experiments frequently, since predators often spoil the nest. The birds always behave in the same way: the pair build a new nest unless the existing one remains quite intact.

In the case of Pyzhik and his mate this is already their second nest. The first was destroyed - we suspect by a weasel⁴. Over several days the female built the new one, giving Sergey the opportunity to record once more the process of nest-building almost from scratch.

This time fate has dealt with Pyzhik differently: he has lost both nest and mate. It is hard not to feel compassion for the little bird. But his tragedy gives us a new variant of the experiment. With both the pairing and the nest disrupted, what will the male do?

Sergey goes off on a round of the nests. Apart from the fact that it is he who normally monitors them, he is also still catching and ringing females. For this he does not use the usual nets, but a much smaller contraption - a *luchok*⁵. He positions this over the nest, sets it, and goes away. Later he comes back and pulls the string which draws a small net over the nest, and over the female too hopefully. The method hardly ever fails.

I stay behind to observe Pyzhik. Looking at him you would not imagine this to be a devastated husband, a father robbed of his children, a victim of cruel fate. The cheerful little bird skips from branch to branch, alertly captures small insects, and all the while keeps up the singing. He manages to sing even with a caterpillar in his bill. But then what is so strange about that? Do we have any great difficulty in carrying on a lively conversation over dinner? True, it is not so easy to sing with some tasty morsel in one's mouth.

From time to time Pyzhik flies up to the treetops to sing particularly vigorously for a few minutes, without being distracted by the hunt for



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insects. In short, he is a willow warbler behaving like any other. Over there is Koka, skipping around, catching insects and singing in just the same way.

What am I really expecting from Pyzhik? What would he gain from pining over the corpse, or sobbing, or going into a hysterical frenzy, or tearing his hair (feathers, rather)? Of course, nothing. One of only two things could happen: either Pyzhik will leave the study area, or he will not. In principle this is all that will need explaining. So what, I ask myself, is the point in my hanging about near the wrecked nest? It will suffice to come here now and then and to listen for Pyzhik's singing. That is all.

All the same I do not go away. I feel an inexplicable longing to see him fly down to the nest and show some sign of his relationship with his deceased mate. What a deep-rooted desire we have to detect in animals some human quality, to see them as somehow like us if not in appearance then in behaviour. Or if not in behaviour then in the inner life which we subconsciously strive to find in our 'lowly cousins' despite all common sense and logic, despite our real knowledge of them.

But nothing changes. Pyzhik continues to behave just like a bird, showing absolutely no signs of sadness. I am convinced that he will stay. He will go on singing like the others, and as he has done up to now. You see, the male warblers do not incubate the eggs and do not feed their brooding mates. During this period they are occupied solely in psalmody, in occasionally chasing off other males, and in feeding themselves; admittedly sometimes too in wandering through their neighbours' patches on the sly. In brief, they lead an easy life, unencumbered with family cares, until the nestlings hatch.

Having waited a little I go. We have already had a similar experience with a willow warbler. A stoat⁶ caught a female directly on the nest. But in that case both the clutch and the nest were untouched, save only for a small feather and a drop of blood at the edge of the nest's entrance. I remember picking up the feather, examining it, and then letting it drop. The male whose nest it was we continued to hear up to the end of July when we left at the end of our field work. He went on leading a solitary existence because no new female came to him. An interesting thought: will a new female come to Pyzhik?

I visit him several times and confirm that nothing new has happened. He sings. Either the nest and his mate have simply ceased to exist for him, or up to now he has never managed to take a look at it and so remains in blissful ignorance of the catastrophe which has befallen him.

Eventually Pyzhik flew away, and disappeared for ever.

Why is this of interest? When the nest is destroyed but the female remains alive, the male does not leave his territory. The male also remains when his mate dies but the nest is not damaged. During the brooding period the males apparently call at the nest regularly, but the absence of the female from the undamaged nest should not put him out, since she must leave it from time to time in order to feed. Evidently the nest, if undamaged, or the presence of the female, if the nest should be destroyed, is enough to keep the male on the territory. But Pyzhik had lost both his mate and his nest.

However, all this is speculation, and we have only two cases to go on. To be quite sure we need enough examples to be able to generalise. Two birds, just like two humans, may be completely different from each other in character and behaviour.

We can only wait and hope that this mystery will sometime or other be solved. During research it quite often happens that we land up with more new riddles than solutions to problems we had set out to answer. It is almost a law of nature. If it were otherwise life would be simply boring.

17. ENCOUNTER WITH THE TUNDRA СВИДАНИЕ С ТУНДРОЙ

From early spring we had been reminded of the tundra. Scoter¹ flew over, bound for the north, and sometimes there floated down, from somewhere above, the calls of dotterel², sounding like radio signals. On several occasions we also heard overhead snatches of the melodious mating calls of golden plover³. The delicate silhouettes of long-tailed skuas⁴ swam past above our heads. If only we could rise into the sky, to be nearer to where all this was happening.

Occasionally, when nest-hunting took us across the river and we stood on the bare slopes of the opposite bank looking out to the south-east, we were transfixed by a magnificent panorama - the snow-covered ridges of the Subarctic Urals. With binoculars we examined the extensive patches of snow, the rocks and boulder fields alternating with bare patches of tundra. Through many kilometres of pristine, crystal-clear air, it was easy to pick out individual trees and even rocks and bushes. Judging by the map, the tundra was only about eight kilometres away, to the south-east. Moreover we had an entirely plausible excuse for a long excursion: we needed to traverse forest of different types in

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order to get an idea of what habitats our warblers were occupying. There would also be a chance to come across comparatively rare birds which were missing from the surroundings of the camp and plot.

And, to tell the truth, we were missing the wide open spaces of the tundra, and wanted to quell this nagging nostalgia. Besides, we had been too long in one place, and this sharpened our hankering after novel experiences.

So there we were, having chosen a cool, early morning hour for the most difficult part of the route (the ascent), leaving the camp and carrying small rucksacks with a saucepan and provisions for one day.

On the way we occasionally came across nests, and these needed to be recorded and described. They included those of thrushes, little buntings, bramblings, and of course warblers.

A kilometre and a half from the camp we entered dense and gloomy spruce⁵ forest. Inside, it was dark and still. Here and there we came across black-throated thrushes⁶ - both adults and already fledged young. Several times we heard a chiffchaff, in places where the forest thinned somewhat and under its canopy a young growth of spruce and bushes was forcing its way up. Later we encountered chiffchaffs again, but now in tall forest where it was not so thick. They have not appeared at all on our plot. It is puzzling that this species should like such gloomy surroundings here, while in moderate latitudes it inhabits much less dense woodland, and further north, on the tundra, they are quite common in completely open sites, where even willow patches suit them if about a metre high. Once again it was impressed on us that you cannot rely on representatives of one and the same species to be much like each other in different places.

Pressing on through the gloomy spruce forest, we heard an unfamiliar song. It was something like a robin's⁷. More than likely it was a red-flanked bluetail⁸ - a small rather robin-like bird with large eyes and unnaturally blue back and tail. We very much wanted to see it, but when we tried to get closer by going around both sides at once, there was nothing more than a vague shadow glimpsed fleetingly among the spruce branches. So our visual acquaintance with the bird remained of the most tenuous kind.

Progress was slow, being delayed now by a nest, now by having to find a way around wind-felled trees. In places the recent storm had piled up debris into such barricades that we had to make a detour, so deviating seriously from our fixed heading. Occasionally it was necessary to go hundreds of metres alongside tree trunks. It became clear that storms as

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violent as our recent one are not so frequent. Judging by the decayed state of the previously fallen timber, the last comparable storm must have occurred at least forty to sixty years earlier. The ascent soon became steeper. Dense patches of spruce alternated with glades, and stony slopes became more frequent. The boulders worn smooth with the passage of time looked very picturesque. They were piled up, one upon another, in wonderful disarray, some rocking terrifyingly underfoot with a muffled knocking sound. They were covered with moss and lichens, creating fanciful patterns from the patches of different colour and shape. It is difficult to tear yourself away from such a place, the mossy boulder fields surrounded on all sides by equally attractive spruce trees hung with dishevelled beards of lichen. You sit in silence on soft stones and contemplate this unimaginable beauty. Everything is wild, virgin, with no trace of human activity. You fear even to drop a spent match lest, heaven forbid, this primordial perfection should be tarnished.

We are now ever more frequently crossing these fields of rocking rocks, trying not to fall into the hidden crevices between the moss-covered boulders. The forest thins out and lets in more light. Larches⁹ appear, at first individual trees and then groves of them alongside willows and alder¹⁰. In between are patches of tundra, mostly covered with dwarf birch¹¹ - deformed miniature trees with tiny shining leaves. Like old acquaintances these dwarf trees amiably try to clutch at our boots with their twisted stems. So much of the tundra is covered by this plant, and it is exhausting to tramp across it. All the same, it is not altogether unpleasant.

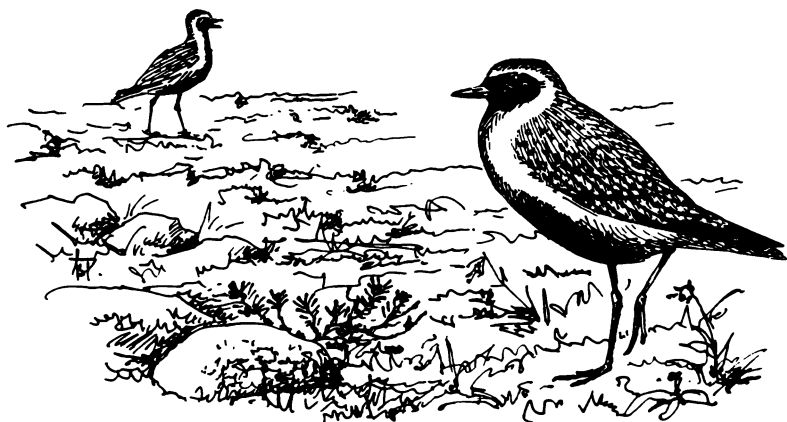
We reach the edge of the forest and come out onto the mountain tundra. Ahead stretch enormous patches of stones, damp meadows, and large areas of dwarf birch looking like cultivated fields. Here and there are patches of alder, with occasional larches topped with the one-sided crowns characteristic of the elfin woodlands of mountains and forest-tundra. Endless wind is the ruling force up here. And now, emerging from the shelter of the forest, we notice with some relief that there are appreciably fewer mosquitoes. Moreover they are more circumspect in their behaviour: rather than swirling in a swarm about one's face, or striding about on one's back, probing with their probosces every millimetre of clothing, they settle and then hang on grimly, grasping the coarse fabric with all six legs.

From the scarcely audible gurgling of water we guess that a stream is flowing past under the boulders. We find where it comes to the surface, and boil up some coffee.

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About a hundred yards from the fire, a small larch enigmatically gleams with pale pink freshly exposed wood. We go nearer and stare at the barkless trunk. There are minute tooth marks on the bark and wood. During the winter, voles have treated themselves to larch cambium - the same 'wood *kasha*' which even humans have to eat in lean years. The cambium of a tree is the layer of young cells situated between the wood and bark, and which allows the tree to grow in girth. The gnawed places are about level with our chests. In winter everything will have been covered by snow up to this height, and so here it was that the voles set up their café. Now the tree is dying. Why was it precisely this larch which the voles picked on, leaving all the others around untouched? Is it possible that individual larches have different tastes, just like carrots from the same row in the garden, or even apples from the same tree?

There is only a narrow zone of forest tundra¹², making the forest edge fairly sharp. And there are plenty of birds here, as at any forest edge. Willow and arctic warblers are just as numerous as on our plot in the Syvyu valley. Little buntings bustle about with a quiet melodious twitter, and large-eyed bluethroats stare mistrustfully from neighbouring bushes. The calls of crossbills and snatches of thrush song remind us how close we are to the spruce forest proper, which stretches up the mountains in long tongues from below. Pine grosbeaks¹³ warble tunefully and bramblings twinkle. Those crested beauties, the waxwings, fly out of the spruce forest onto the tundra to peck at last year's bog bilberry¹⁴ and crowberry¹⁵. And right here, in the clearing, meadow pipits run around, bobbing their tails, while wheatears¹⁶ fly back and forth over the boulder field, chacking as they go.



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When we find ourselves on the crest of the ridge, puffing and panting from the steep climb, we are met by a pair of golden plovers. Their voices have a pleasant and slightly sad intonation, but the tedious repetition of exactly the same doleful fluting uttered when the birds are alarmed soon becomes irritating. Wary plovers may accompany a walker for up to a kilometre, now flying on ahead, now running from one hummock to the next, where they stop for a time in a frozen and suspicious attitude. And they never let up on the fluting. In summer on the tundra they become a real pain in the ear. Wherever you go, you are made to feel an unwanted guest, contaminating the birds' peaceful existence with your presence. One pair takes over from another, so that there is no end to the melancholy flute-like calls. On this occasion, though, the plovers quite soon leave us in peace. Evidently their nest and more likely the already hatched young are some way off, so they have no special cause for alarm.

The mountain range's main 'ridge', which we have climbed, is really a ridge in name only. It is a practically flat area of tundra stretching along the top for several kilometres. Here and there, like the ruins of prehistoric dwellings, tower piles of rocks and flagstones. There is a complete absence of bushes, nothing but low herbage, mosses, and lichens. Not far from us the ridge ends in a great rocky prominence, its northern side littered with patches of remaining snow.

Further to the east, beyond a small valley with a narrow strip of forest and small stream, begins a vast mountainous area - a land of rock and snow. That is the real Subarctic Urals, the longed-for goal of any self-respecting tourist.

We decide to spend two hours exploring the tundra separately - merely to wander, or look for nests. For some reason no nests come my way. I don't want to make a special point of searching out bluethroats and meadow pipits: we have them down below. A dotterel - a small and pretty wader, related to the plovers and similar to them in habits and shape - for some reason reacts to me with some uncertainty. Hiding behind a rise in the ground I begin to watch it. But the dotterel merely goes on feeding for a long time, and then flies off.

Crossing over to a boulder field I hear an unfamiliar sharp whistle, or more accurately something between a whistle and a squeak. I stop and try to figure out what kind of noise it is and where it is from. Strange, but it does not seem to be anywhere in particular, in no obvious direction. Puzzled, I sink down on a stone and look all around, even up - but above there is nothing but empty sky with a few small clouds.

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The sound is not repeated. Somewhat discouraged I continue looking around, recalling all the birds whose calls I know, and do not know and which could possibly be here. No explanation comes to mind. Now I spot, in front of me on the boulder field, a small heap of dry vegetation, and suddenly everything falls into place: it must be a pika¹⁷. At long last I have made acquaintance with a real live pika, the 'haymaker'. I have known of its existence ever since my childhood, from elementary nature books, and later I read more about it in zoology textbooks and other weighty tomes. The pika is a small animal about the size of a rat and related to the hares. The pile of vegetation, actually pika hay, is their food store, and on account of these piles it is also called *senostavka* or 'hay-stacker'.

I look around and notice a few more miniature haystacks. And here are the animal's droppings, a pile of little spheres, like hares' only much smaller. It is well known that *mumiye*¹⁸, brought down from the mountains by those who seek this legendary medicine, is in fact pika droppings, but changed out of all recognition by the passage of time, and possibly no longer recognisable with certainty. Pikas live mostly in the steppes and treeless areas of various mountain systems. One of the species, the northern pika, inhabits our Urals.

Searching for *mumiye* does not appeal to me. What I see in front of me certainly is not medicinal, and I immediately recall that only very recently we were treating ourselves with (or to?) the same kind of unripe *mumiye* from the bag of rice. But I would very much like to see a living pika. I look around and select a comfortable little spot. It is lower down the slope on the boulder field and has some large, upward projecting slabs. I consider walking straight there to make myself comfortable but, thinking about it, decide that the little creature might be capricious. It should be made to believe that I have gone away, and somehow I need to convince it. So, deliberately stamping on the stones and blundering against boulders, I go as far as the edge of the boulder field, and on a bit further in the same direction across the soft tundra. Then I creep around in a semicircle and land up at the same cover which I'd thought of walking to directly. Very quietly I get myself into a good position, raise the binoculars to my eyes, and remain quite still. It is very comfortable sitting there against the raised stones, out of the wind.

I have no idea whether my simple stratagem has really had any effect. Maybe it was entirely superfluous. But after a quarter of an hour I spot the pika. It climbs up onto a stone, looks around, and then for a long time remains motionless in a proud sphinx-like pose. In this position it



looks rather like a small hare. I am hoping to see it doing something, but it just sits. Soon it is time to go. Very gently I lower the binoculars and also try to stand up equally slowly - just out of interest. Sometimes wild creatures do not notice such slow movements. But the pika gives out a familiar sharp whistle and disappears in amongst the boulders.

Sergey and I meet up again as agreed, at a great pile of rocks on the summit of the ridge. He relates how he too found no nests, but did see a reindeer. It was grazing in a windy spot, evidently like us enjoying the absence of mosquitoes.

Before making our way down we stop for a smoke and once more admire the view. It is impossible not to be carried away by the stark beauty of the mountains. We gaze with profound awe on this realm of rock and eternal cold. I doubt whether any museum, with all its fossils, can so impress the soul with a feeling of the antiquity of the world as can mountains. They were here in the past, and in the future they will still be here. Their age is unimaginable. What are we humans in comparison with these? Nothing but crumbs. One human lifetime comes and goes in a flash. All our scientific knowledge of geological processes, and of the birth and ageing of mountains and of the whole Earth, seems here, among the mountains themselves, somehow abstract and unreal. Ideas, reason, nations, cultures... - all recede into the background, pushed aside by the most stable and permanent things on Earth - mountains.

Mountains seem to bring out in us an inner, and more often than not unrealised, urge to renew our contact with eternity. I am no rock climber, and not particularly attached to alpine tourism, but maybe that is my loss.

I doubt whether anyone else gains quite the same pleasure in attaining a difficult goal as the mountaineer who has just completed an ascent. The sensation is understandable. At the start you feel tiny and

HYPOTHESES AGAIN

insignificant beside the bleak and vast bulk of the mountain before you. Then you set off, overcome obstacles, face danger, conquer fear, and finally - most important of all - prove to yourself that you can reach the goal you set yourself. And there, on the summit, you will see the mountains in quite a another light, feeling yourself a superior being, not so different from the mountains themselves.

18. HYPOTHESES SHATTERED ONCE MORE НОВОЕ КРУШЕНИЕ ГИПОТЕЗ

The holiday is over, and we have returned to earth. It is back to work. Once more, for five days I follow the singing warblers and map them. On the surface it seems nothing much has changed on the plot, but the map that emerges this time is radically different from the situation only quite recently. The territories of the willow warblers and arctics no longer overlap! There is mutual exclusion.

So all those earlier hypotheses were a lot of nonsense, and it is working out exactly as on the Yamal Peninsula. I feel as though I am back to square one. But it is not quite so bad. This time I know everything that has gone on in the warblers' territories. How mutual exclusion comes about, and even the reason for it, are now tolerably clear.

It soon became obvious that the territories had contracted. This means that mistakes in recognition are not entirely a matter of indifference to the birds, and the willows and arctics have separated in order to avoid unexpected and unnecessary conflicts between males of the two species. Now I understand what happened in Yamal: I found the territories already separated, and missed the earlier stages in their development. Here the separation of territories was unexpected only because it did not happen right from the start. The warblers have provided a model demonstration. And it is already clear, even if the results have yet to be analysed properly, that the surprise is in fact an old sweet in a new wrapper: there is no actual interspecific territoriality in our warblers, just as there is not in the case of many other closely related species which have been studied in a similar way. The nests of both species had already been built by the time the territories were separated; they were constructed at an early stage, when the boundaries were still being fixed.

Contrary to one of our earlier hypotheses, the willow warblers did not prevent the arctics from occupying the sites that suited them. The males

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sang away while the females built their nests wherever they pleased. Then after the separation of territories, some arctic warbler nests turned out to be inside willow warbler territories, and *vice versa* - a comical situation.

But something else is much more important. It remains the case that we have two closely related species living side by side in the same forest, occupying the same habitat. This does not square with theories of competitive exclusion.

However, it is too early to speak of agreement or conflict between facts and theories. We still do not know where our warblers collect their food, or what in fact they are eating. If they do have different diets, or find their food in different places, then there simply is no competition between them.

We are already impatient to discover where our little birds are obtaining their food. Up to now we have had nothing to go on except discussions about competition around the supper table. It is still too early to investigate the matter: we need to wait until the warblers' eggs hatch.

19. HOW TO FIND NESTS КАК НАЙТИ ГНЕЗДО?

I am sitting on a pile of branches, doing nothing. Sergey wanders past swinging a stick and staring ahead, concentrating on the ground in front of him. Rather than proceeding in a straight line, he is zig-zagging, like a gun-dog. He notices me, and comes up.

'What are you waiting for?'

'Galya.'

'I'm looking for her too.'

'Don't bother, she went off - because of me.'

'Long ago?'

'No, not so long. Sit down, we'll work together.'

Sergey sits down. The subject of our odd conversation is an arctic warbler, the female GA. Twice today I have passed close to her nest. Each time Galya slipped away without me noticing, and announced herself with an agitated, harsh 'tset, tset' while she flitted about high up in the canopy. Then she disappeared. It is clear that the nest is somewhere near. Today Sergey has heard her right here.

We wait a little longer to give Galya a chance to return unobtrusively to her nest. Then we agree a plan and set off on parallel courses. We

diligently use our sticks to disturb any likely place in front of us where the nest might be - and all other places too. Our eyes dart right and left. We ought to be scanning the ground not only right in front of us, but in the distance too, so as not to miss the little bird as it flits away.

'Tset, tset, tset' comes down to us from somewhere up above. I feel I could boil over - even evaporate - with rage, frustration and resentment. Once again this miserable little creature, with only a few drops of grey matter in its head, has pulled a fast one on us, *Homo sapiens* no less. What humiliation....

'Here it is!' comes the triumphant exclamation from Sergey. He is kneeling in front of a juniper¹ bush, with his stick held aloft like a banner. I run over and flop down beside him in front of a mossy mound riddled with vole holes. In the depths of one of the holes are seven tiny eggs, white with small reddish flecks. They rest on a nest-lining of plants - arctic warblers do not pluck feathers for their nests.

The whole of Galya's simple cunning consisted in the fact that, at the slightest sound, she would nip out from the nest straight into the thick juniper bush, and from there to a nearby spruce. Only when she had flown up to the canopy would she start giving her alarm call. This time though she stopped to stare, and then flew out directly from under Sergey's stick. He saw where she had emerged from, but still did not find the nest straight away: there were too many holes in the mound.

Sergey is already lying with his nose practically in the nest as he does mysterious things with the sliding calipers and draws the layout in his notebook. He is very pleased with himself. Galya has not disappeared - there is no point. A second arctic warbler appears, and now they are tsetting together. The second bird is obviously Pak, since this is his territory.

Even so I examine his rings. It is not Pak! It's Lazhik. What conjuring trick is this? Lazhik's territory is two hundred metres away. Suddenly we hear an arctic warbler's threatening chirr. This time it really is Pak. The threat is directed at Lazhik, who immediately submits and flies off. For the sake of appearances Pak chases him a short way, then calmly glances down at us, flies up to the top of a birch, and starts singing.

Sergey finishes describing the nest and we go back to the same pile of branches where we encountered each other a short while ago. Galya calms down and we seat ourselves, deciding that this whole business calls for a smoke.

'Well, whose nest is it? And whose mate is Galya?' Sergey asks the questions that I too have on the tip of my tongue.

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I think out aloud: 'It is Pak's territory ... Lazhik is anxious about Galya....'

'Did you get a good view of the rings?' asks Sergey doubtfully.

'Of course. It couldn't have been any other bird. Pak is singing up there, and Lazhik tsetting directly overhead. It is his nest - Lazhik's. You must admit, we haven't found any nest in his territory.'

'No, nor anywhere near it. But his patch is way over the-e-e-re, beyond Koka's. And this is the only nest Pak has got.'

'But it is Lazhik who was tsetting. Tsetting! While Pak was only chirring - and not at us but at Lazhik. You'll see, we'll find Pak's nest somewhere here. Let's have a look,' - I flick through my notebook - 'Zhanna was ringed over there. And then the day before yesterday she was caught just here' - I point to the furled net a short distance from us - 'Have you found Zhanna's nest? No, you haven't!'

'And where is Zhanna getting upset? Nowhere! Here it is Galya who is tsetting - there she is', and Sergey points towards the nest.

'There is no doubt about Galya, she is simply a scaremonger. And maybe Zhanna is the opposite - more reserved. You have to admit, she is nowhere in sight, and we can't hear her.' I am defending my position.

'And what if Pak too is reserved and your Lazhik is a scaremonger - yes, and a universal one, rushing around the whole plot looking for any excuse to yell at us? You are irritating him beyond endurance, always hanging around, staring at him, spying. It would be enough to get on anyone's nerves. In his position I too would fly up to you and shout "There he is, there he is!" - as if you were a cuckoo....'

I come to my favourite's defence. 'That's great coming from you. You have poked your nose into all the nests, measured the eggs. But Lazhik you won't disturb. Go along to his territory and try to get a tset-tset out of him. You won't succeed. There is no nest there.'

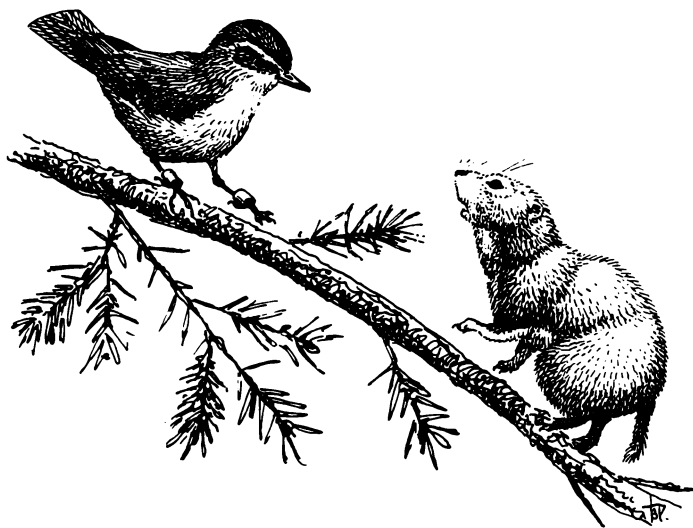
'What if it has been destroyed, and that's why it is not there? What would there be to tset about?' Sergey has come up with a new version of his theory.

'And why tset here, if this nest isn't his?'

'Lazhik hears that his neighbour is tsetting, and decides to imitate. It does happen, doesn't it?'

'It does happen,' I agree, 'but not often. Lazhik has grown accustomed to us, so he won't tset anywhere any more.'

'You just wait: we'll find his nest, his old lady will get into a panic, and then you'll see how "accustomed" he has become. Besides, a female has been caught on his territory, and whose is she?'



This time I have no answer. But it is clear to both of us that, contrary to the proverb², from our argument truth is not emerging. We must search for a nest in Lazhik's territory. And another one too: somewhere here, not far away, is Zhanna's. Altogether the arctic warblers' nests are giving us problems - not calculated to calm us both down.

For the time being we give up on the mystery of Galya's nest. Everything will become clear when the eggs hatch. The father will feed the nestlings, which will identify Galya's mate. At least the nest has been found, and that is good news. Let's hope nothing wrecks it.

For a while longer we remain sitting on the log, sifting through the various possible arrangements of nests and territories. Then I notice a warbler quite close on a spruce, so I pick up the binoculars. It is Zhanna. I tell Sergey. We remain motionless and watch her. Perhaps we shall now find her nest, and the mystery of Galya's will be solved at the same time. Zhanna silently flits from twig to twig, paying no attention to us. But she does not come down lower. There seems to be something up there, on a bough of the spruce, which is attracting her interest. Could it be a nest? No, impossible: she is an arctic warbler, and they do not nest in trees. Among the branches we get fleeting glimpses of some other small bird which is occupying her attention. But wait a moment, it is not a bird at all, it's a red-backed vole. Oh those voles! What took it up there, high up in that tree?

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Sure-footed, just as if it were on the ground, the vole runs up and down the branches, now and then stopping to sniff at something. Zhanna flies quite close, and settles on a twig nearby to scrutinize it. The vole raises its head, sits on its hind legs and stares at the warbler. For several moments we are entertained by this scene in the tree. Then the vole descends the trunk, head first, and soon reaches the ground. The warbler accompanies it right to the bottom, apparently merely out of curiosity, reacting just as we are to seeing a vole in a tree. It strikes us all as being an event not quite in the normal run of things. Finally Zhanna disappears into the thick birches, so bringing our observations to an end.

Searching for nests is a chancy business. As in hunting, success depends largely on the benevolence of Fortune. But luck by itself, without skill, brings with it - again as in hunting - only a slim hope of success.

With some justification we can claim to know a little about willow warblers' nest sites and how to look for them; but we are not so well placed when it comes to arctic warblers, and with good reason. At our previous study sites arctic warblers were not so numerous. Then the nests themselves pose a problem: they might even occur, believe it or not, in a rodent burrow. Can one really search every hole? There are also other sorts of nest - a little *shalashik* of moss under a fallen branch, or a hole under a willow bush. And they are always camouflaged, almost to perfection.

Nests may be hunted in various ways. If they are large and in trees they are easily spotted, as in the case of birds of prey and magpies. Nor is it difficult to spot thrush nests. Chaffinches and bramblings nest in trees too, but their constructions are small and coloured the same as the tree trunk by the addition of tufts of moss, pieces of birch bark, and lichens, so that you cannot make them out immediately. Who does not know the siskin - a very common bird? But it cannot be said that every ornithologist has seen a siskin nest. They build them in tall thick spruce trees, hiding them moreover among the densest foliage. Have a go, try finding one!

It is not so difficult searching for nests on the ground. There is no need to climb trees, for one thing. On the other hand most ground nests are well camouflaged, making it no easy task to find them.

Sometimes you are just plain lucky. You search somewhere, the bird darts out, you take a look - and there is the nest. But others you can walk past quite closely more than once, and the female sits tight, as if dead. Or else she may have flown earlier, unnoticed.

NESTS

When the nestlings have hatched the search procedure is easier. An elementary method of espionage may be used - shadowing. Sooner or later a parent feeding nestlings will return to the nest, so you only need to keep your eye on the bird and try to be unobtrusive. Of course this method demands time and patience, but it produces results faster than many others.

Sometimes you will find a nest simply by Intuition. An amusing fellow, Intuition. It can happen that some mysterious force seizes you, and an inner voice says, 'Have a look at that mound, there should be a nest in it.' You go over, have a look and, lo and behold, there is indeed a nest.

Unfortunately, just now while we are hunting for arctic warbler nests, the inner voice is either altogether silent, or merely mumbles something incoherent.

It is not only professional ornithological enthusiasm which drives us around the plot and its surroundings in the search for nests. The nest is the 'stove where the dance starts'³; and although I am 'dancing' in my research further from territories and nests, without them nothing much can be understood. The examples of Pak and Lazhik, Galya and Zhanna are fresh in our minds. Sergey's work revolves around nests - breeding periods, number of eggs in the clutch, duration and rhythm of brooding, frequency with which the nestlings are fed, their growth and development, the pattern of parental activities, and much else besides. Comparing the biology of willow and arctic warblers, Sergey will draw conclusions about the adaptations which permit each of these species to exist here in the northern taiga. The earlier a nest is found, the more can be learnt from it.

When the nestlings hatch and the adults are feeding them, Sergey will take samples of their food for analysis, and my job will be to find out where and how the parents are searching for and collecting the food items.

So, we have to find the nests. We pick up our sticks - which we use as a sort of scarecrow - and spread out through the forest. Thus occupied, our eyes dart here and there, and our ears pick up the rustles and sounds which betray a bird's anxiety. The whole body is alert. If a bumble bee is disturbed and suddenly flies off, by reflex action we turn in its direction and freeze. But our hearts have already missed a beat and take a moment to start up again. It is just like in fishing, when after long hours of wearisome inactivity the float suddenly gives a quiver but immediately settles down lifeless once more.

20. THEIR DAILY BREAD

В ПОИСКАХ ХЛЕБА НАСУЩНОГО



The first arctic warbler nestlings appeared on 3rd July - tiny pinkish bodies with blue lids over the still closed eyes. They lay in a heap on the grass lining of the nest cup, making feeble movements. It only took a glance to see that it was still too early to take food samples from these minute and tender creatures. A newly hatched warbler nestling weighs only about one gram.

Ornithologists studying nestling diet have for many years used the so-called 'collar' method. This consists in fitting a collar around the nestling's neck and tightening it with woollen thread to the point where the bird can still breathe but cannot swallow food brought by the parents. The food remains in the gullet until the researcher carefully removes it with forceps. To make sure that the nestling does not starve, the collars are frequently removed to allow them to swallow food the parents bring, or instead these slaves of science are fed with specially collected flies, worms or meat. An improved method is now available, using light aluminium strips instead of the wool, so - no more painstaking tying of knots against the tender neck of the nestling. The aluminium strips can quickly and easily be fitted and removed.

The 9th of July was fixed as the day to begin work collecting food samples from the five-day-old arctic warbler nestlings in one nest. This was paired with a willow warbler nest nearby, containing nestlings of about the same age, to ensure maximum comparability of the results from the two nests. If instead, for instance, the feeding of willow warblers in a meadow had been compared with that of arctic warblers deep in the forest, you would know the results from the two nests would be different before you started.

Before setting off from Ekaterinburg, Sergey had prepared various sizes of collar, but they were found to be a bit too large. Fortunately, though, we also discovered that excellent collars could be made from the aluminium lids of the glass jars that the Bulgarian compote 'Assorti' comes in. Suddenly we found ourselves forced to unseal the last two jars of compote. The contents were used immediately for their intended purpose. Compote was not one of our staple foods, and so had been purchased in small quantities only, as a luxury. But Science demands sacrifices, and so we sacrificed the compote. It was not too painful.

DAILY BREAD

Next we took specimen tubes from their box and set to, half filling them with 70% alcohol. These were for preserving the food samples until they could be analysed in the laboratory. We soon discovered another hitch in our arrangements: there was not quite enough alcohol, and so we had to make up the requisite quantity with alcohol destined for other, 'medicinal' requirements. We do not consider ourselves hard drinkers, but on occasion have no objection to catching the kind of mild cold that requires simple but radical measures over supper. Now though we had to become reconciled to the necessity of cutting back severely on the number of colds. This sacrifice for Science we bore with a good deal less enthusiasm.

When everything was prepared, Sergey began collecting samples of the birds' 'dietary consumption'. My job was to study the 'shopping arrangements'. From its waterproof packing I extracted a portable tape recorder and checked that it still worked. When you are watching a bird, there is not always enough time to note down what you see. This was my job - to record on tape all I could observe of warblers collecting food for their nestlings: what kind of tree, the bird's position in the tree, such as its height above the ground and distance from the trunk, how the bird was moving through the branches, and so on. And all this had to be in coded form, for brevity. I had already struggled to develop this code at home, but it turned out not to be very practical. After trying it here I have had to redesign the system.

To do this recording I go into the plot and find a position convenient for observation and not far from a chosen nest. Once the bird has flown to the nest, delivered the food it has brought and then flown off, taking with it a whitish capsule of nestling's droppings, I switch on the microphone and begin to record observations.

In this situation I regret that I am, by nature, not very talkative and do not have the experience of a football or - still better - a hockey commentator. Continuous droning into a microphone tires not only the tongue but also the lips and even cheeks. Because it is frequently necessary to raise the binoculars to my eyes, then remove them and search for the bird with the naked eye, my eyes get tired from constant refocussing. My original idea of what it would be like recording warblers' feeding behaviour - by whispering a relaxed commentary into the microphone in the peace and quiet of unspoilt nature - turns out to be very far from the truth. And I am often heartily glad when the bird being followed suddenly disappears into the dense branches or flies so far off that I cannot keep up with it. Then it is indeed pleasant to shut

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my eyes and mouth and sit down for a moment to have a rest, or even just relax standing up.

However, it really is not possible to take much rest, since there is little time available for this tape recorder work. There are all kinds of reasons why. In clear weather the mosquitoes revive after their nocturnal numbness at 6 to 8 o'clock in the morning. You only have to look up without screwing up your eyes, and a mosquito will unfailingly fall into one of them and perish, causing the maximum inconvenience in the process, which in this case means putting my eye out of action. Extracting a mosquito from one's own eye, using a metal compass mirror, is not one of the pleasantest of pastimes. Your hands are smeared with acrid repellent, while other mosquitoes are already crawling into your eyes. The warblers are arboreal birds, and to watch them it is usually necessary to look upwards. To avoid the insects hovering above from colliding with your face, it is best not to take the binoculars away from your eyes, but to raise them and use them in place of a hat. Even then it is not always possible to see much through the dense flickering and whining cloud.

By day we begin to experience the heat of summer. The number of mosquitoes in the air noticeably decreases. But their place is taken by the blackflies and, much worse, clegs. We only discover how terrible they are when they become very numerous. The whole forest is filled with a deep hum. It suffices to wave your arm at random and close your hand, and you will unfailingly catch one or two, or sometimes up to five large and surprisingly heavy insects. When the Deet stops working, your first warning is the smarting sting of a cleg bite. This is the signal to smear yourself afresh. We already know from previous experience, and are now convinced once more, that when blood-sucking insects are really abundant, smearing a new layer on the face and arms, on top of the old Deet, is not very effective. It is necessary instead to go to the river and wash with soap, so that the new Deet can go on clean skin. Some days we have to wash and apply a new layer five or six times.

Strange though it might sound, the blackflies - those most unpleasant of taiga blood-suckers - do not give us much trouble. What matters is to prevent these small persistent creatures getting under your clothing. If you remember that we have to wear this heavy insect-proof clothing in the heat of summer, you will understand that working conditions are far from ideal. We are frequently driven to tearing off the protective clothing, washing, and climbing into a sleeping bag, where we can at last close our eyes in peace and breathe deeply, not through our teeth. Only

then is it possible to forget all about not wiping the sweat off our face with our arm, and not touching clothing with the back of the hand, which might rub off the protective grease.

Clear nights are a blissful time. There is ice in the bucket. Two-winged blood-suckers of various sizes hang numbly from the tent flaps; not one is to be seen in the forest. It is possible to walk around and work. But the birds do not collect food at night; they take their rest. So for the tape recorder work I have only a few hours in the morning, when the birds are already awake but the insects have not yet warmed up. And rainy weather is no good at all: the binoculars are useless.

We have spent a long time observing the feeding warblers, hoping to detect differences in the willows' and arctics' methods of hunting. To the naked eye there are no differences at all. Even now, making a special study of them and spending dozens of hours on observations, I cannot point to any.

Similarities there certainly are. Both species seek food mainly by hopping along branches and flitting from one to another. As they go, they examine the leaves and twigs around them. Sometimes they hang in the air with quivering wings, rather like humming birds and hawk moths at flowers. Incidentally it is only now that the meanings of the Latin names of our warblers occur to me, and it is striking how relevant they are to our present interests. The willow warbler's Latin name '*Phylloscopus trochilus*' means literally 'leafwatcher-humming bird', while the arctic warbler - *Phylloscopus borealis* - is 'northern leafwatcher'. Francis Boie, who gave the leaf warblers the name '*Phylloscopus*' or 'leafwatcher' as early as 1826, was clearly a good observer. It is quite true, most of a leaf warbler's time is spent looking at leaves.

The importance of these aerial acrobatics for willow warblers, as indeed for all other leaf warblers, is not very great. It is obvious that, although they are small, they are no humming birds. However, lacking the ability to perform the humming birds' amazing tricks does not mean they go hungry.

Much the same can be said of their other methods of feeding - which are very diverse. Leaf warblers can clamber about on vertical tree trunks, like tits and even like nuthatches¹, head down. They can examine the undersides of twigs by hanging underneath them, like redpolls and siskins on birch catkins, and crossbills on spruce and pine cones. Both willow and arctic warblers climb reasonably well up and down vertically hanging birch branches or stout stems of herbs, a habit very

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characteristic of the sedge warblers that inhabit dense reed beds. Just like flycatchers, leaf warblers can catch a flying insect. Clearly they can cope with most problems. Possibly one or other of these various hunting methods will be brought into service in certain situations, when food is not so easy to find. But the main method, used by the vast majority of the birds, is simply to hop along the branches, and this is true of both willow and arctic warblers.

It is still too early to say whether there are any quantitative differences between them, or whether their hunting methods are exactly the same. That will have to wait until everything on the tapes is decoded and expressed in numbers - the time spent on each method of hunting, the species of tree hunted in, the various heights and parts of the crown used - and all that has finally been analysed statistically. Only then will an unambiguous conclusion be possible.

Wandering about the plot with the tape recorder one day, I happen to solve the riddle of Galya's nest. Both she and Lazhik are feeding the nestlings. But we are still not entirely clear what Galya is up to. Why did she take it into her head to build her nest outside Lazhik's territory, which has plenty of suitable spots in the form of cosy little corners with mossy mounds, junipers and spruces? There are even mounds with rodent burrows.

It seems that Galya is so fussy that only this site on Pak's territory satisfied her, and none of the others would do. Even Lazhik himself could not find any way of preventing his partner's shortsighted and freakish behaviour, with the result that he now finds himself in a predicament. Even in his own house, with his children all around him, he has to hide from Pak. To sing, Lazhik has to fly back to his own territory, which now serves no other purpose and indeed is practically useless: there is no nest in it, and like Galya he collects food in the vicinity of the nest, in the territories of Pak and the willow warblers Azhik and Zhuzha.

Sergey has managed to track down Zhanna's nest. It turns out that she and Pak are indeed man and wife - a very contented and quiet pair. They consider us quite inoffensive, like a kind of moose, which does not destroy nests and eats only herbage and twigs. Even when Sergey takes the nestlings out of the nest to weigh them and remove food samples, Pak and Zhanna patiently wait in nearby trees with bundles of insects in their bills. It is only occasionally, as if purely for form's sake that they express some anxiety by tsetting.



Observing the warblers' feeding habits, I am again impressed by the birds' individuality. They may only be little birds, but each has its favourite methods and sites for hunting. Azhik likes to collect green sawfly larvae among his impenetrable willows. His neighbour Zhuzha preferred feeding two days running in birches, at a great height, and then adopted a spruce patch in Pak's territory. Pak likes these spruce trees too.

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His partner Zhanna meanwhile, like a true lady, prefers flowers in the clearing, which she collect flies from. She frequently feeds in herbage and on the ground. Koka also often flies there for food. One day Azhik spent the whole of a calm evening fluttering about, almost like a swallow, over the river catching swarms of midges. We never again saw either him or any other leaf warbler feeding in this way. The willow warbler whose nest was nearest to the camp took to capturing mosquitoes and clegs on our tents. So for them as for humans, be they hunters, anglers, or mushroom collectors - each in his own way.

Despite the fact that the foraging males by no means confine themselves to their own territories, and often dart in and out of their neighbours' patches, they do not at all like it when those same neighbours pay a return visit. We often witness a proprietor chasing off a neighbouring male. But females are permitted to fly in search of food wherever they like. Neighbouring males do not chase them, nor do they try to make advances towards them. And neighbouring females behave towards each other with complete indifference.

21. WHAT IS THE POINT OF TERRITORIES? ЗАЧЕМ ЖЕ НУЖНА ТЕРРИТОРИЯ?

If the female does not always build her nest in them, or if birds do not always respect their boundaries when looking for food, then why have territories? Why does Lazhik continue to sing on his patch, when it is no earthly use to him except as somewhere to sing?

For most birds, territoriality involves defending a certain area against incursions by others of the same species. In most species - including our warblers - defence and incursions are a matter for the males. One of the main functions of territoriality is that, in a given area of forest (meadow, field, and so on), only a certain number of males can settle, and so the number of nests is also limited. In this way territoriality prevents over-population.

We witnessed how the resident males ruthlessly drove out other males wishing to settle on the plot. Although a male's territory is not an area in which just he and his family forage - neighbouring birds make use of it too - nevertheless the existence of territories ensures that there is in fact enough food for the adults and nestlings. By regulating population density, territorial behaviour also limits the pressure on the food resources of the whole bird community belonging to one species.

TERRITORIES AGAIN

There is a strict lower limit to the size of each male's territory when new members are entering the community. No doubt this minimum size, or in other words the maximum population density, is a result of an age-old process - the evolution of the species.

In evolutionary terms the advantage went to those groups of birds which had a sufficiency of food, for both the adults and the nestlings. At the same time it was beneficial to the species to have the maximum population density, so that the maximum number of adults could raise a correspondingly large number of offspring. The important thing is to ensure there is enough food for all, so that nestlings do not die or become weak from starvation. A compromise is needed, and in the process of evolution this compromise has been found in the form of an optimal population density for each species.

There is one other important function of territoriality. Most birds, including our warblers, are not in a position to defend their nests actively from predators. Mobbing of owls, hawks, cats, foxes and other feathered and four-legged predators does not usually help drive them away: it serves only as a general warning of the presence of an enemy and of imminent danger. It can happen, admittedly, that the predator may not put up with being psychologically attacked by small birds, and so makes off; or the racket made by the small birds may attract larger ones whose nests are not far away and which might be able to drive off the predator. But, more often than not, such a commotion does no good, and the predator calmly gobbles up eggs or nestlings in the face of the combined anger of the parents and neighbours.

Territoriality - preventing birds settling right next to each other - serves to spread their nests out. The search for nests, dispersed over a large area and also well camouflaged, poses considerable problems for the predator. (We have good reason to know that!) A high nesting density, in the form of a colony, is possible only for birds which can defend their nests, or which enjoy natural protection in the form of inaccessible cliffs or tall trees. Such colonies are also located within easy reach of abundant food sources, such as the sea with plenty of fish in it.

Our river has become much shallower. In it have appeared rocky shoals like irregular staircases down which the water rushes. The voice of the river has changed too: it is quieter now, calmer, and perhaps rather higher pitched.

One morning, while following warblers around with the tape recorder, I noticed that the sound of the river had suddenly grown

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louder. I stopped and soon picked out a certain rhythm among the general noise: someone or something was crossing the river at the shoal. It was a little alarming. Who else could be coming to our bank, to our campsite? Animal? Human? It might be a prisoner on the run, and possibly not just one. We were familiar by hearsay with all kinds of stories about such people, including one quite recently from Volodya Indyukov. Such an encounter would be by no means welcome. Better if it were an animal, even a bear. An evil man is worse than any animal. Besides, in the summer the bears are peaceful.

The noise was coming closer. I behaved as if I too were an animal or fugitive prisoner - took cover in the willow thicket and began watching the clearing between me and the river. The river itself was not visible since along the bank was a thick belt of alder with some birch and willow. My heart thumped unpleasantly.

By the bank the wading noises in the water died down. Evidently whoever was coming had stopped to look around. There were no voices. Then a few more splashes, twigs cracking, movement in the vegetation... - and there appeared a massive nose followed by the face of an elk with large young antlers covered in dark brown, almost black skin and short fur.

Later, recalling that moment, I had the distinct impression that I stood in the bushes and smiled in welcome. It is probably true. Thank goodness it was not men up to no good, and not even a peaceful bear, which I had also been wondering about. The potential crisis turned into a delightful taiga encounter.

The elk came out into the clearing, halted, and then faced the river and spent some time listening, turning his head in various directions and moving his ears. He could neither see nor hear me, standing quietly hidden. There was no wind and evidently my scent was not drifting across the clearing. It looked as though the elk was more interested in something in the direction he had come from.

Then the beautiful great beast set off, with long strides, along the clearing parallel to the bank, occasionally shaking his head on account of the midges, and disappeared into the forest. I was relieved to know that none of our nets was set over there: a muscular elk could have got entangled in them, leaving them hanging in tatters from bushes, trees and its own antlers.

Going over to the spot where the elk had stood listening, I examined the deep spoor from its great hooves and then went across to the bank. The river was empty, nothing except for the usual common sandpiper



flying about. When I sat down on a stone and started listening, over the noise of the river and on the other side I could clearly make out the anxious calls of willow warblers - 'fyooeet, fyooeet'. Something was over there. For a moment the bushes seemed to stir, then it was as if a kind of shadow came and went immediately. But however carefully I searched the opposite bank through the binoculars, I saw nothing more. Nothing but a dense wall of greenery.

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The anxious warbler calls now came from further along the bank, and died away. What made the elk move on, and what upset the warbler? Or perhaps there was nothing else to link the two. Whatever happened, it remained one of the many secrets of the forest which were all around us.

22. ZHAK IN THE DOCK, AGAIN ЕЩЕ РАЗ О МОРАЛЬНОМ ОБЛИКЕ ЖАКА

We thought that Zhak's domestic arrangements had been clarified some time ago. Right in the middle of his territory, Sergey found a nest when it still had only two eggs. The number grew to seven.

Now Zhak and Aga (AG) have seven large nestlings. I have come to them to observe and record on tape how they collect food. Aga flies to the nest frequently, and the records of her hunting methods are already copious enough for us to call it a day. Zhak feeds them rather rarely, and I ascribe this to his unsettled character. Even in spring he acquired the reputation of being not a particularly good husband.

To be honest, I am not particularly keen to wait around, but Zhak arrives back at the nest after flitting around other birds' territories. From the time that his and Aga's eggs hatched, another unpleasant trait surfaced in Zhak: he became very mistrustful, bursting out with anxious calls aimed at us even when we were at a considerable distance from the nest. So observing him became something of a trial. It was necessary to hide carefully and observe from afar. As a result many of the details of his feeding behaviour could not be recorded.

But if a procedure is adopted, it must be adhered to. I step back from the nest and disappear into the willows, holding the binoculars at the ready. There is a large clearing between me and the nest. The nest itself is not visible, but I have a good view of all the bushes and trees near it. Aga flies in several times with food. Eventually Zhak appears too. I wait while he feeds the nestlings and once more sets off in quest of food, and then switch on the microphone.

Following the edge of the clearing, Zhak first works his way up two nearby spruce trees, flies on to a willow bush, disappears into the herbage near it, and reappears in the same bush. In his beak there is already a reasonably large bundle of insects, so it is time for him to fly to the nest.

In Zhak's movements there appears the characteristic warbler habit of hopping along the branches, no longer in search of food but apparently just for the sake of it. Although these hops seem rather pointless, the

bird is actually looking around to make sure the coast is clear before flying down to its nest unnoticed.

I switch off the recorder to save tape. However Zhak flies - not to the nest - but in the opposite direction, and a little nearer me. Hopping along the twigs of a large birch he disappears into the herbage again, and then reappears with no food in his beak. 'He has eaten it all,' I think to myself, 'yes, it happens. He does have to eat, after all. Only why did he collect a whole beakful?' I switch on again and continue dictating, satisfied that Zhak cannot see me. Again he collects a beakful of food, and dives into the same herbage instead of flying to the nest.

Suddenly it clicks. I jump out of my hiding place and, not looking where I am going, race headlong to where Zhak disappeared. He flits out ahead of me and immediately starts calling hysterically. But I pay no attention to him. In a tiny honeysuckle¹ bush there is a barely perceptible mound. A nest!

'Se-ryo-ga-a²!' I bellow to the whole forest, 'Se-e-e-ryo-o-o-o-ga-a-a!'

From the nest, frightened by my yells, jumps out the female. A green ring flashes on her leg. The contents of the nest look like a minute living bunch of yellow flowers, alternately blooming and suddenly wilting. The tiny nestlings, now one at a time, now all together, raise their pale heads, each topped with a little sparse fluff, and open their yellow mouths. Their comparatively enormous heads rock on their thin necks and soon drop from exhaustion, only to be raised again after a few seconds. Sergey comes up, silently looks at the nest, then at me, shrugs his shoulders, scans the tree, locates the calling warblers, and stares at them through binoculars.

'So... ZA. Exxx-cellent. Hm, and who is the male?'

I sit on the ground and smirk complacently.

'Zhak!... Zhak!... He is a bigamist!' Sergey sits down beside me, examines the nest, and holds out his hand to offer congratulations.

'Turn it off' - he nods at the recorder. 'So, at last!' he exclaims once more, referring to Zhak and the nest.

Having more than one female mate - in scientific jargon polygamy or polygyny - is perfectly natural in some bird species. One example is the domestic hen, and its ancestors still found in India. But the majority of perching birds or passerines, the group our warblers belong to, are monogamous - just one male, one female, and the nest.

When ornithologists took to marking birds with coloured rings and so were able to recognise them individually, they began to discover on

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occasion trios similar to the one we have just discovered - a male and two females. There were, correspondingly, two nests. At first these cases were assumed to be anomalous, but later it became clear that they were not so uncommon. At any rate for a long time now they have not been considered unusual. Cases of bigamy have also been found in leaf warblers. Hypotheses have been suggested to explain the expediency of such irregular pairings. But hypotheses are only guesses, and they need to be proved. The fact is, though, that for most hypotheses there just is not enough relevant information. So every example of bigamy represents a valuable fact. That at least is something to be pleased about. Every detail is worth having.

As for Zhak, we do already know something about him. For instance, his first mate is Aga, and in her nest there are eight-day-old nestlings. In ZA's nest they have only just hatched. So Zhak's second mating was not simultaneous with the first, but at the time when Aga was completing her clutch and beginning to brood. With no-one keeping an eye on him, Zhak was attracted to the single ZA - who was then probably not yet ZA but simply an unringed willow warbler. A new relationship started.

'And what shall we call her?' I ask Sergey, who is occupied with describing the nest.

'ZA? Zaznoba³!' he suggests after thinking a moment, 'No, better would be Zemfira⁴.'

'Hmm... her life-style does not exactly fit *that* Zemfira,' I reply, thinking of Pushkin's well-known heroine. 'She needs a name to do with harems, something Islamic. What about Zulfia? Or something with African connections?' I try to remember an African name beginning with 'z' or, better, with 'za'.

'Don't be such a pedant.' Sergey lifts his head from the nest. 'Z-Zem-firA-A: it's got a Z, and an A, Zem-fi-ra!' He makes a flamboyant gesture with his hand. 'It is so romantic!'

'Well, maybe,' I agree. 'You never know how this unpredictable lady will surprise you next time.... OK, let it be Zemfira.'

I wind back the tape and search for the end of my observations. The coded phrases are heard, followed by a steady hissing silence, a crackle, some loud shuffling noise, and silence once more. Then suddenly through the whole forest - a hoarse and shattering bellow 'Se-ryo-ga-a!... Se-e-e-ryo-o-o-o-ga-a-a-a!' We both shudder. I pounce on the red knob with the immediate intention of rewinding and erasing that terrible noise, but have second thoughts. Let it remain a memento of our little discovery.

23. DELIGHTS OF THE SUBARCTIC SUMMER

ПРЕЛЕСТИ ПРИПОЛЯРНОГО ЛЕТА

The Kozhim summer is at its height. It makes itself felt not only by the masses of horse flies and midges and by high daytime temperatures. Compared with its springtime appearance our plot now looks quite different. The clearings, yellow then from last year's faded vegetation, are now a luxuriant green. Against the lush background of varied herbs stand out patches of flowers. Monkshood¹ and larkspur² push up violet candles, while among the grey-green willows of the flood plain enormous red paeonies³ give a blaze of colour - quite out of character with the far north. In the Urals they are called Mary's Root. On almost every flower there are small yellow capricorn beetles with black stripes on their wing cases. They are taking their fill of the soft yellow pollen. These lovely beetles lead the life of a sybarite among the bright red petals, and make the paeonies look even more exotic. The sight of them reminds me that somewhere, far off, are the extravagant and garish tropics.

In spring the massive shoots of a giant angelica⁴ attracted attention, like mighty fists punching their way through the soil. Now they are unfolding their off-white umbrellas about one and a half to two metres above the ground. On these umbrellas there is always an abundance and great variety of flies. By day they swarm over the inflorescences, drink nectar, buzz and crawl around, but during cold nights they hang lifeless among the flowers from the tiny claws on their stiffened legs. In the mornings, when it is still cold, our warblers like to browse on these umbrellas, picking off the defenceless flies.

It is not only flies and warblers the angelica attracts. On one occasion while out tape recording I came across the slightly wilted leaves of an angelica strewn around in the trampled undergrowth. In the centre of this patch the stump was scarcely poking up above ground level, while round about were scattered the pieces of its umbrella inflorescence. There was no sign of the stem. My first thought was that Sergey had cut it. Who else? But why would he want the stem? Perhaps he had an urge to recall his childhood, pretending he was a Malay tribesman with a blowpipe. And why not relive childhood for a while and spit into a tube? Who amongst us has not played pranks with such a thing at school? Both Sergey and I carry a stout knife, essential for working with nets, but this stem has been broken off. No, it has been chewed! Hell, this is a bear! Not for nothing is this giant angelica called *medvezhya dudka* [bear's pipe]. In fact both the leaves and the umbrella have been chewed, not

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cut off, and here and there tooth marks are visible. Tracks lead to the roots of an overturned spruce. On the bare ground beneath the roots are clear bear footprints with clawmarks. The small prints of the fore paws are not visible; they are covered by the large hind paw prints, leaving only doubled impressions of some of the claws.

Well I never, what a pleasant neighbour to have! Suppose I meet him now, what should I do? Shout 'Go away, go away' and brandish the knife? It would not be very impressive. I expect I would say, 'Misha⁵, I stand in awe before you.' But what if it is Masha, and even more important what if she should have Mishutka with her? Clearly she will not want to hear out my declaration, even if, as is likely, I would have more respect for her than for Misha. It is not for nothing that inhabitants of the taiga dislike encountering she-bears; sometimes they immediately leap to their cubs' defence whatever the circumstances, particularly if you suddenly come face to face with them.

I start tracking again. I catch myself looking around and hearing rustling sounds I had not noticed before. But there seem to be no grounds for concern: there is only one set of footprints, and the animal is clearly not very large. Besides, bears are notorious cowards, especially in summer.

The tracks lead beyond the plot towards the hills, and into a patch of spruce where on the firm ground among sparse herbage the footprints are barely visible. Tracking begins to get boring and I go off to look for feeding warblers, so that I can get back to my work.

From somewhere overhead there comes a faint monotonous silvery trill. The sound can only come from a waxwing. Now here's a bird worthy of attention. Who is not familiar with waxwings? In winter, flocks of them fly into our towns, especially in years when there is a poor crop of rowan⁶ berries in the forest. They feed on the berries and small apples which from autumn onwards are hanging on the trees in squares and streets. When a flock of these crested birds with the invariable silvery trill flies over the town or weighs down the trees, only the most gloomy, apathetic or overworked of people will not turn aside to watch them.

Yet, remarkably, although waxwings are such familiar and seemingly abundant birds, it is rare to find one of their nests. The reason is that they nest deep in the northern taiga, hidden in among the branches of dense spruce trees, and near the nest they are shy and retiring. So finding a waxwing nest is understandably a point of honour among ornithologists. Besides, it is quite simply interesting to examine something you have never seen before.

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I soon catch sight of one waxwing, then another. They are hopping unhurriedly from branch to branch at the top of a tall spruce tree, occasionally concealed among the branches so that only the slight swaying of thick tufts of needles reveals their presence. When a pair of birds spends a long time pottering around in one spot, there is usually some reason. It is not very comfortable staring upwards through binoculars, with one's head thrown right back: neck, arms, shoulders and even back soon start aching. But my interest is aroused now, so I suffer patiently. The birds, after hopping through the branches and trilling several times, fly off and in some anticipation I work my way around the tree, carefully examining the likely spot through the binoculars.

There it is! Several bits of herbage are poking out from the dark bundles of spruce foliage. Grass and other herbs do not grow on trees! I am almost ready to congratulate myself. Going up to the tree I hang the tape recorder and binoculars on a branch, pull my hood up to prevent twigs and things falling down my neck, and climb. It is a good tree - thick and with well spaced branches. When I reach the nest my heart is beating faster, from not only the effort but also excitement. Now I brace myself more comfortably against the trunk, which is quite thin at this

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height, plant my right foot in a more secure position, and take a look. I am going to see - very much want to see - pale bluish-grey eggs with brown or black flecks. That is what I have read somewhere.

Alas, the nest is empty. My hopes of making a discovery are dashed. But then this often befalls the forest ornithologist: you climb and climb, all to no avail. I make myself more comfortable and examine the nest closely - thin dry twigs, lichens, and strips of birch bark. What looked like herbage from below turns out to be horsetail⁷. The whole nest is old, faded, tangled and caked. Anyway, it is most likely a waxwing's, since nothing else has a nest quite like it. Why this pair was messing about here for so long is not clear. Maybe we shouldn't always try to find rational explanations. If you or I, wandering through the forest looking for berries, fungi or game, come across an abandoned hut, *shalash*⁸ or collapsed dug-out, we take a look at it, simply out of curiosity. But curiosity is not only a human quality: you find it in many other animals, particularly higher ones like mammals and birds.

It is not very comfortable perched in a spruce tree above the forest canopy. It is cold. The wind is not only penetrating but also swings the tops around as it sweeps past. Maybe you don't get dizzy, but all the same it is unpleasant. We humans are not used to it, being accustomed to having something firm under our feet. You need to be a bird, squirrel or monkey to feel secure in a tree. Now though I want to examine the nest more closely, and make a start by pulling out first a spruce twig, then a caked hazelhen feather, and now some disintegrating lichen. Here I find in the thick nest lining a small piece of eggshell. It is obviously rather faded, yet a faint bluish-violet tint can still be seen. The fragment has just one tiny spot, neither brown nor black but grey, almost violet. It is rather like thrush eggshell, but not quite the same. Besides, the nest structure is nothing like a thrush's.

There is no doubt that waxwings used this nest last year. Moreover the nestlings fledged successfully. The evidence for this happy outcome is that the lining is trampled down by the growing nestlings and there are the remains of droppings in it - an indiscretion they permit themselves only just before leaving the nest. The fragment of shell bears no trace of membrane on the inside surface. If the nest had been raided by a predator it would have been a clean well-defined cup with no droppings, and the egg membrane would have remained as a thin film on the inner surface of the shell.

Having decided to climb down and groping around with my numb leg for a lower branch, I notice that down below some of the small

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spruce trees growing thickly around the edge of the clearing are swaying. There is no wind at that level, so I assume it must be Sergey and prepare to hail him. But instead I now make out among the spruce trees the reddish-brown back of a bear - something I have seen before only in zoos and circuses.

How wonderful to be watching a real, wild bear. I am enjoying this. It takes a few moments to realise that the pleasure is partly relief that I am up in the tree while it is down below. And although a bear is a bear I am seized by an inexplicable and irrepressible urge to behave like a lout. Filling my lungs I let out a loud and terrifying yell. I just yell, with no words - why waste them on a bear? He suddenly jumps, freezes for a moment, then vanishes. Two spruce trees sway one after another, I catch sight of something fleetingly in the glade, and several times hear a faint crackling. That is all. Peace. Not a single frightened roar, rustle of falling branches or crash of a tree pushed over by the great fleeing monster.



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It strikes me as comical and slightly scary. From all this and from the fact that my legs have grown numb and my arms tired, climbing down is not easy. From time to time I hug the pleasantly scented spruce trunk to have a laugh and get my breath back a bit. I recall a rather appropriate *chastushka*⁹:

‘A hare sits in a birch, armed with a crowbar.

What’s he waiting for? Maybe a bear....’

Just now I am a bit like that hare, but without the crowbar. I remember how some old books give a graphic description of the mysterious and memorable phenomenon called ‘bear illness’. The bear is supposed, when very scared, to be afflicted by terrible diarrhoea and sometimes, if extremely scared, even to die of fright. Generally I do not take such stories seriously. However even the slight prospect of coming across a rather soiled but at the same time large and eminently edible animal in the spruce grove seems not only comical but also quite alluring. Fresh meat after our monotonous diet of *kasha* and stuff out of tins would be no bad thing. And it would not be poaching. Or would it? Hmm.... I stop on the next branch and ponder. This raises a new question: in this case would it be a carcase or game? If game, then poaching. But if a carcase, then what?

Hesitating, I pause on the lower branches of the tree. What if it is alive, and still vengeful? I look around once more and then courageously jump to the ground. After shaking myself down, I hang the equipment around my neck and go over to where the bear had been. Occasionally I stop, listen, look around, even sniff. There is no trace of the bear or its ailment. I feel the knife at my side. It is not an absolutely reliable weapon against a bear - but a weapon all the same.

The tracks are hardly visible. At the spot where the bear emerged out of the spruce grove the vegetation was powerfully torn up in several places. Clearly he was in a healthy enough state when he took flight. Under the curtain formed by a large spruce tree, through which I could see nothing from above, the clumsy creature must have made off towards the hills in great leaps, knocking over clumps of plants and tearing up moss with its claws. Then its pace slowed to a walk. And the illness? - absolutely no sign of it. My non-victim had quietly and confidently carried on, away from the site of our encounter, away from the plot and the camp. Lucky for the bear, I think, that I did nothing to it. But immediately it occurs to me that that is being a bit cocky. Perhaps I am the lucky one - for being in the tree, and is that why I behaved so outrageously? They say that it is not only bears that get ‘bear illness’.

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My high spirits evaporate. I sit down on some fallen branches and take out a cigarette. The fragment of waxwing eggshell falls out of the matchbox and becomes hopelessly lost in the pile of rotten branches, bushy lichens and green moss. I am upset - but not on account of the eggshell. I feel mightily ashamed that a supposedly cultured representative of the supposedly civilised human race should behave so badly in front of a bear, quite apart from the question of my own self-respect. It begins to feel like a grievous offence. I was clearly in the wrong.

We were never to meet this lord of the forest again. It seems our encounter did not leave him with pleasant memories. However another bear, somewhat larger, did come to visit us. It ate the eggs out of one of the arctic warbler nests. But what are eggs like that to such a beast? It wrecked the nest, licked it, and spread its remains all over the place. But that did not satisfy it, and it did the bird no good either. It then found a redwing's nest, and again ate the eggs and pulled everything to pieces while slobbering over it. The nest was on the ground. When the thick jungle of herbage grows tall many redwings take to nesting there instead of in the trees as in the spring and the bear took advantage of this.

It is of course a nuisance whenever we record the destruction of a nest by some predator. But we had to admit that, this time, there was some satisfaction in carefully noting on the nest filing cards the words 'destroyed by bear'. It was not just some measly old crow.

On several other occasions we came across evidence of a bear's visits to our plot - sometimes meandering tracks through the herbage, sometimes chewed giant angelica, for the sake of which it evidently came to the flood plain of our river. In one spot it dug out a hole almost a metre deep to extract some root or other, or follow a vole burrow.

Summer has brought a little relief to our monotonous menu. True, there are still no berries, and fungi have not yet made their appearance. But we collect and consume large quantities of the spear-shaped leaves of sorrel, which grows abundantly by the river. The sorrel replaces our fast declining stock of vitamins in the shape of onions. We tried several times to boil up *shchi*¹⁰ from the leaves, but it wasn't to our taste; the green leaves are better. Then we began boiling, or rather brewing, meadow sweet¹¹. It dominates whole glades on the plot with its white, asymmetrical inflorescences. You pick a bunch, dip it into the boiling water for a second - no longer! - and instantly you have an aromatic tea.

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We have to admit that the giant angelica is not to our taste. We know it can be eaten fresh, mixed with other things to make a salad. It can also be used to make *borshch*¹². But we find the smell rather sharp and unpleasant, and we gladly leave the bear his delicacy.

Bathing is one of the commonest problems of expeditionary life. The solution depends on circumstances. We have several times fixed up a lavabo. Usually the night hours are chosen for this, when it is cold and nothing is biting. It is not so pleasant sharing one's nakedness with biting insects; better to be cold. Using two pails of water heated on the camp fire we get the impression of having something approximating to a shower, and it does prevent us from becoming entirely unfit for human society. But as for the washing - first you shiver from the cold, then you scream when you are scalded. Going into the settlement twenty kilometres away for a bath when there is scarcely ever any free time would be an unpardonable self-indulgence.

So here we are one day down on the river bank where we usually wash, with a great blazing fire. Once more we thank goodness that we are in the taiga: with an abundance of dry dead wood we do not need to economise on fuel. Stones collected from the river bank are heating in the fire, while on it are two pails of the purest mountain water. We had unexpected luck with the pails: we found them by the tourist trail. It seems they had been discarded at the last stopping point before the settlement. In fact it was the pails that suggested the idea for a new type of bathhouse.

The store tent, already reasonably empty, has been temporarily divested of its remaining contents and pitched on the river bank. We are following the proper procedure by preparing switches or besoms of birch twigs, and in place of the *mochalka*¹³ we shall use a length of mist net that has had its day. In the tent we have laid sticks in place of a floor and set down on it one pail of cold water, one pail of hot, and an empty one to serve as washbasin or tub.

We draw lots and it falls to Sergey to have first go. When he crawls into the tent I send in the fourth and most vital pail - the one with the now very hot stones. This is the crucial moment, the test of the core concept in our bathhouse, the *pièce de résistance*.

In the first few seconds it becomes clear that our calculations have been completely vindicated. First I hear the sharp hissing of steam and the gunfire cracks of stones breaking. Then comes a delighted roar from Sergey, together with other noises among which can occasionally be

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discerned individual words expressing perfect contentment. I perform the duties of bathhouse attendant, bringing up pails of hot and cold water, meanwhile scratching impatiently. Again I listen with pleasure to the triumphant commentary from my colleague about how all the horse flies, mosquitoes and midges that crowded into the tent have perished in the steam.

Then we swop roles. Taking his turn as scourge of the mosquitoes, Sergey busies himself with the fire and pails while my inhuman wails issue from the tent. Frightened fish jump out of the river, the herbage droops in the meadow on the bank, and the good-natured subarctic sun smiles down indulgently from a cloudless sky.

24. WE GO FISHING

РЫБАЛКА

On 12th July it becomes much colder. The thermograph is once more plotting an almost steady line at about plus 3–4°C. For hours on end a depressing cold rain falls from the low clouds. Sergey's work has come to a standstill. If he takes nestlings out of their cosy warm nests in the rain, with cold wet hands, it will do them no good at all. It might even kill them.

A cold spell in summer can be very dangerous for nestlings. The parents have trouble finding enough insects, which take cover, grow torpid and are difficult to see. Even flies disappear from the flowers. But the young ones still need to be fed. The female often has to keep them warm with her body, and that leaves much less time to look for their food. In these conditions, taking food from their gullets would be inhumane to say the least.

My own excursions with the tape recorder are also practically useless. The rain quickly floods the binocular objectives, and the eyepieces mist over from the cold and moisture as soon as I raise them to my eyes.

We were ready for this bad weather, and not only because we were expecting it. When, day in day out, and all the waking hours you do nothing but work, work and more work, with breaks only for sleep, meals and daily chores, fatigue builds up. Then it can happen that you begin to think, 'if only it would rain!'

Now it has come. This time the rain has a special advantage for us - we are determined to go fishing. Somehow we ought to vary our menu, and besides we are very fond of a bit of fish. Netting fish is prohibited in this area and we, being upright, law-abiding citizens, have brought no

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fishing nets with us. But we do have the lines, hooks and other paraphernalia required for a rod.

We learnt from Volodya Indyukov that poachers catch Atlantic salmon¹ from the Syvyu in autumn. In summer, though, there are only grayling², and Volodya was not sure if they were here or not. When the river water cleared, we had a look to see where these grayling were. There were none, and instead we saw only minnows³ - tiny fish about the size of a finger - and also some fry. However, not long before the last rain Sergey spotted some quite large silvery fish in a backwater, then we chanced upon them again and even saw that, behind the main dorsal fin, they had another small fatty fin. They were some kind of whitefish⁴, about which Volodya had for some reason said nothing.

So here we are, having slept a long time to the monotonous accompaniment of pattering rain after several fine days spent in exhausting work, waking up with the exciting anticipation of a brief spell of activity that will bring some variety into our lives. We prepare the rods, collect worms which, as usual in rain, are crawling over our path, and set off for the river. We have previously seen whitefish at the far end of the plot, but overhanging bushes make the bank there unsuitable, and so we go higher up, then yet higher, until we find ourselves at a broad stretch near the cliff which we have christened Upper Rock.

It is shallow by the bank, and from the water project large boulders convenient for standing on. Beyond them the bottom drops steeply away and under the cliff the water is deep and black, like at Olyapoch'i Kamen⁵. There is hardly any current, and minnows are darting about near the bank.

Minnows are not what you could call an angler's fish. Even hundreds of them won't make a meal. Even so, we set to, catching them. Floats turn out to be quite superfluous. You can see the fish just going up to the hook and opening their mouths. But the smallest hook with the tiniest piece of worm suits the mouths of only the largest minnows, and these we 'haul' out immediately, not even feeling the weight of the catch on the line. The rest do not stick to the hooks, but just get tangled and then drop off back into the water. Moving along the bank we catch a few more, and then that seems to be the end of our fishing expedition.

Now, though, some whitefish approach from the direction of the deep pool. They all look identical, about two hands in length. It is clear that these are merely the edge of a shoal which is moving across from the pool to our bank. In a panic we bait the hooks with the best bits of worm. The whitefish come closer and stop by the bait, even nosing

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some of it. And then they go past. We each let our hook sink to the bottom, then raise it again nearly to the surface, twitch it, tease it, and one of the fish virtually throws itself at the worm. But it does not take. They even contemptuously refuse not only a caddis fly larva we find in the shallows, but also a spider captured with immense difficulty on the bank, *and* a piece of soaked bread. Whitefish ought to take bloodworms - popular fish food - but we do not have any.

It would have been better not to have seen these whitefish at all. Watching the unmoving float, we should have realised that they were not going to bite, resigned ourselves to it and gone away. But it is maddening to watch the fish up to their tricks. If only there was a fish spear to hand. But we don't even have a kitchen fork, which might have been used to make a substitute spear.

A large landing net could be made of the mist net we use to catch the birds, but what use would it be afterwards? We might even have brought ourselves to throw a whole mist net into the water, but the 14 millimetre mesh is too large to catch the largest minnows here, which would just slip through, and not nearly large enough to entangle the smallest of the whitefish.

We sit on the bank and discuss every possible and even impossible method of landing the whitefish. The hopelessness of each scheme becomes all too evident. Occasionally we glance dejectedly at the small polythene bag, one corner of which is occupied by our modest catch. If we had a kitten here, we could feed it, but two kittens... - impossible. We have to admit defeat.

A female red-breasted merganser alights on the far side of the reach. She has evidently left her nest for a while to feed and starts diving, probably catching minnows. Watching her, we are thinking how unfair it is that *she* can get a good meal from minnows, and *we* can't.

Then suddenly she surfaces with a large silvery fish in her bill. The fish flaps around desperately, the bird beats the water with her wings, and spray flies everywhere. After a few seconds of the struggle everything goes quiet. The bird sits on the water and resignedly shakes her head. She has let it go. For a long time the ripples remain, as a record of the desperate contest.

Why on earth did she catch such a fish - one she could not possibly swallow? Unfortunately the merganser's skills are not those of a bird of prey, which would have torn the prey apart using its beak and talons. Maybe it was a mistake in the heat of the moment - it happens often enough in hunting.

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The merganser flies off. The brief spectacle immediately gives us renewed enthusiasm to carry on fishing, but the feeling soon evaporates. Our luck today is even worse than the merganser's. Yet it is some comfort to know that even such a professional angler as the merganser can be unlucky: we are to some degree let off the hook. We would be better off sticking to our own calling - ornithology.

So we decide to go over to a small island directly opposite us on the other side of the reach. We have been interested in it for a long time, but what with one thing and another... - water too high, or not enough time. The island carries the same kind of woodland as on the floodplain. But many birds have a predilection for nesting on islands, feeling more secure there. Islands in general exert an inexplicable attraction, and we are no exception.

We lay aside the fishing rods, go up the bank a short way and cross shallows to the island. The persistent but light rain after the dry weather

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has not managed to raise the water level. There is nothing of particular note on the island, except for several old thrush nests. Still, we manage to catch and examine a common sandpiper's chick. It is not more than two days out of the shell, and must have hatched somewhere just here, on the island.

We cross back by another shoal further down. This one is broad and quite shallow. Weak currents make their way through horsetail⁶ and burdock⁷-like growths of butterbur⁸. In among this vegetation, which filters the water flowing out of our fishing pool, we discover a dead Siberian whitefish⁹. Behind its head are some deep wounds, of the kind made by the beak of a merganser.

It was the only fish dish of the whole season. In an enormous frying pan lay a few tiny, pathetic, golden-brown scraps - all that remained after the minnows were fried. In the middle of the pan, though, were four vividly pink mouth-watering pieces of whitefish - a present from a bird to the ornithologists. Of course there wasn't enough of it. But the taste was out of this world.

25. A RACE AGAINST TIME ФОРСИРОВАНИЕ

When the rain has died down it is possible to work with binoculars once more. I collect the tape recorder and begin shadowing. In unpleasant weather like this I do not find any radical change in feeding behaviour, in either the willow or the arctic warblers. Just as in fine warm weather, both are mainly occupied in hopping along branches up in the tree tops. Occasionally they hover in the air near twigs and flowers. It is possible that they are feeding on the ground a little more than usual. They seem oblivious to both rain and cold. As ever they are nimble and lively, apparently leading the carefree life of all God's creatures.

But looking more closely, it is clear there is nothing carefree about any of their lives. On the contrary there is indeed plenty to be anxious about. Our birds' young are growing like rising bread, and from some nests they have already flown. Aga - Zhak's first mate - is already wandering around with her brood, while he remains with Zemfira and his other, younger family. On one occasion Azhik's youngsters shot out from right under Sergey's feet, dispersing like a fan. He and his mate had already spent several days with the fledglings near the nest, but then they all disappeared.



Unknown willow warblers appear on the plot with their broods. In behaviour they are not at all like our marked warblers. Ours have long been accustomed to a couple of large bipeds constantly hanging about them, staring into the nests, and even taking the nestlings out but then inexplicably putting them back. Many of the warblers have given up bothering to give alarm calls when we are near. Sometimes we even get the impression that they welcome us. But the new arrivals react to us with panic-stricken alarm calls, warning their yellowish-hued brood hidden in the branches long before we come near. In short, they do not trust us an inch. Of course this is irritating, especially since they quite often create panic among the long-established inhabitants of the plot.

True, not all of them yield to this panic. Once, at nest number 36, newly arrived willow warblers raised a hue and cry at me. There were two of them, evidently male and female. Their fledglings were hidden somewhere in a distant willow thicket, but the adults were taking no chances. They flew up to me shrieking. Then the nest's owner, Koka, appeared with a beakful of insects, followed by his mate. As usual they dropped down to the nest, which was about five yards from me, fed their nestlings, removed some faecal packets, and flew off without a word. Only Koka glanced back over his shoulder with apparent disapproval at

the neurotic newcomers. I noticed that they provoked not the least sign of aggression in him as the territory's proprietor.

The trust shown to me by the owners of nest 36 was so obvious that the panic mongers, calling out 'fyooeet' rather hesitantly a few more times, calmed down and flew back to the willow patch. Koka soon appeared once more with food, dropped down to the nest, and flew off with the usual packet. I completely forgot that the creature in front of me, although two-legged, was not human, and said, 'Thank you, Koka.' With a puzzled expression he looked at me, staring just a tiny fraction longer than he would normally. I felt that his look carried a fleeting impression of mockery, and would not have been surprised if he had tapped a clawed toe on his forehead. But, as before, Koka silently disappeared into the bushes.

At last the fledglings at number 36 were ready to fly. Sergey had already obtained a splendid series of food samples from them and put numbered rings on all of the young. We took care not to disturb them, to give them a chance to leave the nest quietly, without fuss or panic.

And indeed they soon left. It is never easy to part with friends, but here there were also less sentimental reasons for anxiety and regret. The young in all the willow and arctic warbler nests on which we did most of our work had already fledged. They grew and matured, despite the bad weather, since they had good appetites and received enough food to satisfy them. But we were not able to collect food samples from them.

Now at last, during the night of 14th July, when our working days are coming to an end, the clouds desert the Urals and, full of promise, the sky is clear and bright. The temperature drops below zero - to minus two. Hoar frost covers the herbage, trees, and the guy ropes of the tents. It is clear that we are in for a warm day. The bad weather has gone.

No warmth comes with the rising sun. We doze for an hour and a half, but we are already in good spirits on account of generous quantities of coffee and the pleasurable anticipation of getting back to work. At three o'clock in the morning, knocking from the plants yesterday's raindrops now frozen to ice, I am once more on the move with the tape recorder. Sergey is preparing the collars and specimen tubes in anticipation of two sets of food samples. The second is to be collected by me, for once taking off my spy reporter's hat.

Only at six in the morning does it begin to warm up. After a breakfast of *kasha* with the usual coffee, we set off. My nests are at some distance. There are two of them, one a willow warbler's and the other an arctic's,

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about fifty metres apart. Sergey is working with four nests on the plot, and they too are fairly close together. Two other nests suitable for this work, which are on the other side of the river, will have to be left; they are too far off. If only we had another pair of hands.

The nestlings are replete: they have already been receiving food from their parents since early in the morning. The collars which I fit to the nestlings' necks can be left for two hours. Beginning to feel nervous, I go up to the nest, kneel, take out all the nestlings and put them in my hat. In five of the seven nestlings dark food balls can be seen through the thin wall of the gullet and the neck skin with its growing feathers. The two 'empty' nestlings I put back into the nest, but before doing so I replace the bits of herbage which the nestlings had grasped by reflex action and brought out from the nest lining in their clenched feet. Next is the extraction of the food from each nestling's throat. This is a tricky operation. I hold a nestling in the left hand, and with three fingers



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carefully ease the food ball up the gullet. The nestling opens its mouth by itself, and then it remains to remove the ball delicately with fine forceps and place it on a piece of canvas. The young bird is replaced in the nest. They then spend some time shifting about and sticking their heads out of the entrance before settling down, staring fixedly at me. Their stares have no expression, except perhaps for indifference. Only now and then can be detected a slight hint of interest. Of course they have every right to stare with annoyance, anger and hatred. It is a good thing they cannot: it leaves my robber's conscience a little quieter.

After emptying the other nestlings' gullets I take up the samples in the canvas, remove a few small 'presents' - faecal packets - from my hat, and to the accompaniment of anxious tsetting from the parent arctic warblers go over to a convenient little moss-covered mound under a birch. From the moss protrude two large specimen tubes containing alcohol. Into one of them I put the samples, alternating them with layers of cotton wool, and then hurry over to the willow warbler nest. I kneel, unfold the piece of canvas, extract the nestlings.... Then once more to the birch, again to the arctic warblers, to the birch, to the willow warblers....

After two hours' work I take the collars off the noticeably thinner necks, and push into each nestling's mouth half of a fat cleg caught from the air right next to the nest. The session is over. My back, which has been straight only on the way to and from the birch, is aching, my knees hurt, and my hands itch all over where they have been bitten by mosquitoes and clegs.

I trudge to the river, to the spot where we keep our soap and toothbrushes, and where the towels hang from a branch. After a wash and applying fresh Deet, I sit down comfortably under a tree - a chance to sit and do nothing for a while. There are now fifty minutes or an hour to the next session, and meanwhile the parent birds will feed the 'guinea pig' nestlings. If it weren't for the blood sucking insects, we could enjoy the marvellous weather. Even so, it is very pleasant. The river purrs contentedly, rolling over the stones and through stands of butterbur, and playing with the patches of light on its surface. There is a lovely smell of dampness, flowers, and spruce resin from the tree at my back.

I wake with a start, as happens when you have been on a tram for a long time, or are at a boring meeting. There is a stench, but where from? I am sitting as before under the tree, but my head has slumped onto my chest. Across the anorak in front of my nose slowly crawls a stinking bug with a tattered wing. It seems I have accidentally injured it by brushing against it with my arm, and now it is taking revenge in the only way it

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knows. I shake off the bug and slowly come to. I dozed off for ten to fifteen minutes, and my eyelids and lips, which had no Deet on them, are now bitten all over by mosquitoes. It's a good thing it is only mosquitoes; here by the river it is cool, so there are not many clegs.

I hear another sound. It is uneven and interrupted, now a squeak, now a whistle or a scraping noise. What I see in front of me immediately dispels any lingering trace of sleepiness. Right by the water, under overhanging roots and turf, only three metres away, voles are fighting furiously. The ball of struggling animals rolls around, and only fleeting glimpses of dark and whitish colours are visible.

The ball falls apart, and I can see some kind of vole lying on its back and convulsively twitching its hind legs. Nervously dashing back and forth around it is, not a vole as it turns out, but a water shrew¹. It has lovely velvety black fur, but white on the belly. Shrews are ferocious predators, but very small. They belong to the Insectivores, and do in fact



eat mostly insects, but also worms, molluscs and other small creatures. As its name suggests, the water shrew is aquatic; it dives well and can catch small fish. Here, before me, is a wonderful example of how bloodthirsty it really is: it has just finished off a vole no smaller than itself. The shrew is still bustling around the vole, seizing it in turn by the head, leg, and tail. I imagine how pleased it must be - so much meat all at once. It suddenly disappears like lightning under the bank, and behind me I hear the steps and voice of Sergey, 'What's up?'

'Amazing, what a fight!'

We look at the fresh victim. The toes of one of its feet are still quivering slightly - the last vestiges of life. There are quite a few vole species, many of which look almost identical, so it is no easier

distinguishing them than our warblers. A specialist would be able to readily enough, but we need a textbook or field guide. We do not have one, so we can say no more than that it is a young individual of the genus *Microtus*.

‘Shall we fry it?’ smiles Sergey.

‘You mean, like the whitefish? There wouldn’t be much. Still, it just shows what things are coming to. Everyone around knows we have had to economise for some time with our food stocks, so now they are throwing us fish and voles. No doubt a rumour is going around the whole forest that we are on the verge of starvation, since we are even snatching food from the mouths of nestlings.’

‘Well, if they are so soft hearted, they should tell Toptygin² to drag over an elk. After all, which of them here is Minister of Food Distribution? Can you really call that meat?’ Sergey nods at the vole.

‘That’s what comes of grievously offending Misha; he hasn’t delivered one. It is all my fault,’ I repent belatedly. ‘Supposing he suddenly appears, and remembers....’

‘Yes, and asks: Who was it who bellowed at me from the tree? And I shall say, “Misha, it was hi-i-i-i-im” - Sergey points at me, deferentially glancing to one side as if a bear were already standing over there, demanding satisfaction. “HE - is ba-a-a-a-ad, but I - am goo-oo-oo-ood. And you, Misha, are also goo-oo-oo-ood. Give us some elk!”’

Sergey takes the soapdish, goes down to the water, and blissfully soaps his face and neck. I resume my seat as before under the spruce tree and we placidly continue our nonsensical bantering. When I glance once again at the vole, which we left untouched where it was, it has disappeared. The water shrew must have overheard our talk of starvation and, fearful for his enormous meal, hurried to drag it away unnoticed. The shrew is probably now gorging himself with warm vole meat, soon to collapse into bed to sleep it off. For him it will be breakfast, dinner and tea. It is time we also had a bite. By the clock it should be breakfast, but according to our regime it will be supper - the third supper in a row.

What remains of our rest period is spent over mugs of strong tea. Then two more hours of work.

I am the first to arrive back at camp, quite worn out and surrounded by a droning cloud of clegs. There is no food ready. I collect a pail and go down to the river for water. Coming back uphill is hard work. Half asleep, ponderously placing one foot before the other, like a mountain climber I slowly plod on, not thinking, just like a horse. From time to time consciousness drifts off somewhere else.

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When I come to, it is certainly not in the camp. I am standing in front of a nest which I left not long before. Above my head arctic warblers are tsetting as usual. In my hand, I find a pail of water. It is only when I do get back to camp that I realise the absurdity of the route I have taken. It is highly comical, and that freshens me up, dispelling the soporific feeling. I light the fire, hang a saucepan full of water over it and seat myself on a block by the table.

The clegs continue to swarm all around. I wonder how many there are. One method that could be used is called by zoologists 'capture-recapture'³. It consists in catching a certain number of the creature - voles, fish, ants, or whatever - in the given area, marking them and letting them go. Later, another batch is caught. The proportion of marked individuals in the second catch enables the total population in the area to be calculated.

This has given me an absorbing occupation to pass the time while supper is cooking. Remaining seated on the block, I seize clegs out of the surrounding air at random, and with scissors cut out a tiny triangle from the rear edge of each one's right wing before releasing it. By the time the water is boiling I have already marked forty-six flies. I do four more, to make it a round number, throw the rice into the water, and wait for it to boil once more while seeing to the fire. Meanwhile I remind myself that if in the next ten clegs captured there is one marked one, then according to the equation there should be five hundred altogether around me. If two are marked, the total number is two hundred and fifty. But if four are marked, there are only a hundred and twenty five in all. And so on. This is how it would be in an ideal world - which it never is. So in practice statistics are necessary. To continue the exercise: if I go on to catch fifty, among which there is not one cleg with a notch in its wing, then altogether there would be more than two thousand five hundred. No, more than that even, since the number of marked flies would be continually increasing. But now it is getting a bit complicated, and besides I have forgotten the formula needed in this situation.

Anyway, I carry on with my pastime, catching, cutting and counting, occasionally standing up and going over to the fire. Then the clegs retreat somewhat, the cloud lying in wait off to the side among the trees. But there is no need to invite them back, since the swarm quickly reforms - a splendid opportunity for making captures.

The rice boils. I pour off the water, season the *kasha* with salt and add *tushonka*⁴, set it a little way from the fire, and return to my diversion. When the second batch of fifty clegs has been marked with not a single

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previously notched one being caught, I call a halt to the experiment. But what if the marked ones immediately fly off somewhere, perhaps because they do not like having a piece cut out of their wing, or because my hand smells of Deet? Yet the hind edge of their wings is often tattered anyway, and last time I smeared only the backs of my hands, as always before eating. On the other hand they might have cause for complaint even without the Deet, being caught unceremoniously on the wing and roughed up in my hands.

It is hopeless trying to keep track of several released clegs: they immediately disappear into the throng. There are few insects immediately above my head. It seems they need not only to be flying but also circling around. That of course must be more convenient for them, given their comparatively large weight and high speed. I release a few above my head, but they too are immediately lost to sight, since they fly to the side and disappear into the crowd.

Can there really be so many? Or maybe the capture-recapture method is not suitable for this situation. It occurs to me that perhaps I have in vain let a hundred of them go, when it would have been just as easy to dispatch them.

I cannot agree with some naturalists, who think that everything in nature is rational. In nature there certainly is evil, even if not of the absolute kind. I have seen hares bitten by mosquitoes until they are stupefied, and I have felt pity for an elk desperately blinking and shaking its head in an effort to get rid of these same clegs. And now I myself am increasingly feeling the urge to take revenge for my own suffering.

So much for the attempt to count them. Sergey has still not returned and I must go on waiting. Meanwhile I am managing to make some use of what is around me. So I sit down once more on the wood block and catch clegs. Now however I am marking them differently - disarming them by cutting off the stylets which so ruthlessly pierce not only our but also the elk's tough skin. They are implacable - and so am I.

I release the disarmed clegs above my head and see clearly that with an indignant buzz they fly not just anywhere but straight towards the sun. Why towards the sun, I have no idea, but it is obvious that they are none too pleased by the operation - to my malicious satisfaction. It is not easy to love nature in all its manifestations.

Having disarmed two hundred clegs, I notice that the cloud around me is in no way diminished. I have not once caught a marked insect. Even just within the camp the effect I am having is no more than a drop in the ocean.

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Sergey eventually arrives to find the rice gone quite cold. He brings with him his own cleg escort, so that the noise around the fire gets noticeably louder. We hang the tea saucepan over the fire, and eat.

It turns out that Sergey has been working across the river. It began like this: when he went into the plot after nests, he saw in the meadow alongside the river what looked like two wolves⁵ running towards him along our path. They were still a good way off and Sergey, quietly concealing himself behind a honeysuckle bush, was able to watch them through binoculars, even though the tall herbage meant that he could only see the animals' backs and heads. They were not wolves, though, only dogs. The one running behind was the smaller of the two - a mongrel with some fox terrier blood, judging by the bearded rectangular muzzle. The leader was a laika, similar to a wolf, and Sergey recognised it as Lyusen, Volodya's dog. What a coincidence. Sergey emerged into the open and called his acquaintance, but Lyusen either did not recognise him or did not want to. He turned around for a moment, jumped over his untidy friend (lady friend?), and took to his heels back the way they had come. The dogs ran fast and silently, just as wild animals usually flee from humans. Not once looking back they disappeared into the forest.

Both the willow warbler nests, which Sergey was making for, turned out to have been wrecked. There was no doubt that the dogs were responsible. They had torn the nests to pieces and eaten the nestlings - just as European foxes⁶ and arctic foxes⁷ do. Dogs often do not bother to eat the nestlings, just crushing and discarding them with the nest. It was easy enough for the dogs to find our nests: they had only to follow the fresh, well trodden path. How they came to miss the nearby arctic warbler nests, which also have paths running to them remains a mystery. But it meant that the dogs had destroyed two 'working pairs' of nests, and Sergey had to ford the river and use other willow and arctic warbler nests near to one another and with nestlings of about the same age.

And the dogs? The situation seems clear enough. It is common knowledge that some dogs are genuine strays, with no owners. According to hunting laws these are justifiably regarded as vermin, since they do more damage than wolves. But there are also 'part-time' strays, like our Lyusen. They are especially numerous in small settlements. Around some of these places there is practically nothing left alive, on account of the dogs⁸. I wonder, was it by any chance Lyusen and his mongrel companion who disturbed the elk which visited us from the other side of the river?



The last supper of the day is finished in silence. We assess the 'harvest' - two rows of specimen tubes projecting from the moss beside the tent. We have done well. Now we deserve a good long sleep.

'Have a look over here,' calls Sergey, and points to a birch twig by the tent. On the twig stand several clegs, but there is something odd about them: they are rather short. Looking closer I notice that they are all headless. The cause is Sergey. When he was brewing up tea several hours ago, he was also driven to distraction by the clegs. He however reacted rather more radically than I did - by beheading them. Several of them settled on this twig, and now they are still calmly occupying the same place and like replete houseflies are all grooming themselves with their feet, methodically cleaning their wings. Clearly, when it comes to making yourself neat and tidy, a head is no use at all.

And here we are too, with minds switched onto autopilot, soaping ourselves and carefully washing off the loathsome repellent. Then, already half asleep, we get comfortable under our mosquito nets. Our hands, in the complete absence of any conscious prompting, tuck the edges of the nets under the inflatable mattresses.

26. UNLUCKY ZHUZHA НЕУДАЧНИК ЖУЖА

Our work is finished. The tapes containing all my observations have been packed away and the specimen tubes stand in rows in the moss by the tent. They contain almost fifteen hundred food samples. Each tube is like a colourful layered pie, with white layers of cotton wool alternating with variegated fillings of green sawfly larvae and leaf hoppers, black flies, brown weevils, and red and yellow, or white and red, caterpillars of butterflies or moths¹.

During the morning Sergey goes around some of the remaining nests for the last time. I too pay a farewell visit to the plot.



ZHUZHA

The forest is silent. There is none of that cacophony which was so delightful to the ear in spring. Now the birds sing only occasionally. Here and there you run into a confused fledgling, while nearby the anxious parents make a fuss - thrushes, bramblings, buntings, common sandpipers, and others.

Among the willow warblers on the plot only Zhuzha and Akim are still singing. Akim replaced Kach after his death, and his nestlings are now about to fly. They never cease begging for food, so Akim is kept busy and sings little.

I decide to pay a visit to Zhuzha. Once in spring, while we were sitting on fallen branches listening to Zhuzha singing directly overhead, a lively little animal suddenly seemed to rise out of the ground in front of us, just for a second, only to disappear immediately. It was a weasel.

If there had not been an abundance of voles, weasels would have cleaned out many nests. But Fortune had looked comparatively kindly on the birds this season, and only a few of the warblers had suffered. One of them was Zhuzha. From his nest disappeared first one egg and then another. When only three of the original six remained, the female abandoned the nest. The predator called twice more, but the last egg was not touched. The female built a new nest thirty metres away from the old one, and in it hatched five chicks, which successfully developed and fledged.

And now, early in the morning of 16th July, while I am wandering with the tape recorder not far from Zhuzha's nest, my attention is attracted by the hysterical calling of some warblers. Suspecting something is amiss, I hurry towards the commotion. Sitting in the nest, right at the back, is a single, solitary nestling, trembling violently. Scattered around are a few half-grown feathers, while on the edge of the nest are red drops of very fresh blood. Zhuzha and his mate are dashing about nearby with distracted calls, and some other unringed warblers, both young and old, are in the vicinity - newcomers, and apparently chance witnesses of the tragedy.

After spending several minutes at the nest and not finding the culprit, I retreat, though knowing full well that I am abandoning the last nestling to certain death. It was of course a weasel. No doubt it too has young needing to be fed. But the young weasels I am not acquainted with, I have not watched them growing day by day as I have the youngsters of my old friend Zhuzha, who is already almost a comrade-in-arms in the quest for scientific knowledge. And we are also indebted to this last nestling, since he has provided us with samples of half-swallowed food.

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But to watch over the nestling would be useless. If I do not go away, the female, who is afraid of me, will not visit the nestling, which will simply shiver to death from the morning cold. When I move away about ten paces, the female calms down, but the nest is no longer visible. 'Weasel! Come and eat...' Besides, time is pressing.

An hour later Sergey finds the nest empty.

We have followed the fates of many birds and their nests. But perhaps none of the many tragedies we have witnessed in birds' lives affected us so deeply as Zhuzha's second disaster, especially since the pain was mixed with feelings of our own guilt.

Few of our acquaintances remain on the plot. Azhik, Lazhik and others have departed with their families. Our favourite Koka has also wandered off somewhere. We still occasionally hear the farewell songs of Akim, Mustang and Pak, but we are expecting them to be gone at any time. But Zhuzhik still sings and sings at his usual post, as if he had not been visited with such calamities in his short life.

The willow warbler's song always sounds a little sad. Now Zhuzha's lonely songs in the otherwise silent forest seem particularly anguished. I bid him farewell with a silent nod, and turn back to the camp.

27. HOMEWARD BOUND ДОМОЙ

We are planning to leave at night, and are packing up in lively fashion. Filing cards, specimen tubes, equipment, tents, sleeping bags, clothes, saucepans, axes... - all are stowed away by degrees in boxes, bags, rucksacks. For the first time in the whole season, the tape recorder serves the purpose most people use it for: music pours forth. All summer our ears have been hard at work, and we never had the impression that there was a shortage of noise around. What could be more natural in the forest than birdsong? Besides, any breakdown of the tape recorder had to be avoided on account of our work.

Today we are enjoying breaking the ban on music. In towns, where music surrounds us almost constantly, we take it for granted and the keenness of our perception becomes blunted. Now we find that we very much want to listen to music, and go on listening to it - whatever it is, even the first thing that happens to be on the tape.

To the sound of popular variety songs, we light the traditional cleansing fire. Everything which has come to the end of its useful life, or which would look out of place if left in this wild spot and does not need

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to be returned to civilisation, is consumed by the flames. Scorched tins and other unburnable rubbish we bury in a hole under the roots of a fallen tree.

The packed gear makes a neat pile. Nothing is left at the camp except for the table and wood-block seats, and the wooden tent frames, which can be used next year. Already the beaten campsite with the radiating paths makes a dark pattern against the fresh greenery of the forest.

A large rubber dinghy arrives and is loaded up. The clear water of the Syvyu splashes over into the stern in small waves. It is with a feeling of gratitude that we wave good-bye to this tiny corner of the world which has been our home and laboratory for more than two months.

After so much tramping around those few hectares, it is pleasant to feel we are on the way somewhere, even if not far, and to view our surroundings through the eyes of ordinary tourists. The river has so little water in it that our boat, despite its shallow draught, now and then bottoms on rounded stones. We have to climb out and haul it over shoals, but that is no trouble.

All around is peace and quiet. We admire the picturesque cliffs overhanging the water, and the mist rising in the cool twilight above the quiet shallows.

After an hour and a half we come out into the Kozhim, and see several tents on the gently sloping bank. They make lurid patches against the blue-green of the forest. Light smoke rises from a fire like a candle. Through binoculars we can make out human shapes and canoes drawn up out of the water.

They soon notice us. We moor and exchange greetings. I feel very agitated, and unsuccessfully try to fix a stupid grin on my face, which is probably interpreted as expressing the unqualified joy of a peaceful savage meeting civilised people. Sergey is rather more successful at this than I am.

The tourists are a friendly lot - from Moscow. It looks as though there are two families here, parents with teenage children. It is their first night stop after coming up the Kozhim, and they are hoping to reach the headwaters so they can raft down again. Conversation is lively. We have only very recently been inveterate recluses and almost misanthropes, yet feel real joy at being with people again, and ready to talk as long as possible and about anything at all. Even fresh bread, which we have been dreaming about while gnawing at mouldy crusts, now seems a trifle in comparison with the pleasure at seeing new faces and hearing new voices - human ones, not just birds'.

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When we say that we are returning from an expedition, our companions listen respectfully. Then they ask us about the locality. They are all here for the first time, and were surprised at the frost last night. We assure them that the white stuff on the far mountains really is snow. We confirm that there are elk, deer and bears here, and that we have seen them. But what astonishes the tourists most of all turns out to be the fact that we are not geologists as they had all assumed. For them ornithology is something rather exotic - something talked about occasionally on television.

'Mum, they live in the forest and study birds. How wonderful!' A long-legged girl in her last year at school claps her hands excitedly. 'So you photograph and ring them, do you?'

Touched, her mother smiles, as she would if the girl had met the famous animators of the cartoon films which every child knows. But something else interests her more. She hesitates, but then comes out with it: 'Excuse my asking, but are you married? And do your wives let you come here?' Only a woman could ask such a question. How can you give an answer, a simple one that she would understand?

'But sailors have wives, and so do men working in the Arctic, who go off not just for two or three months in the year like us, but more often or for much longer.' This is how we try to justify ourselves. Mum is not entirely satisfied with our argument, but she does not pursue the subject. The questions from an elderly man are just as practical, but quite different.

'And how much do they pay you? Is that all? It's peanuts. For that money I wouldn't go'.

It is a well-worn theme. Of course we agree that we are paid very little. Indeed, people in our line almost always and everywhere receive rather little, but job satisfaction is more important than the pay cheque. Normally we try to avoid detailed discussion of such matters, but this time we do not succeed.

'You have come here at your own expense, but we are on the job, we are doing field work.'

'And we have come here to be idle,' the old man points out, perfectly reasonably and somewhat self-critically. 'One week's holiday against two months' work - not the same thing. And you live on nothing but *kasha* and rusks. And those bloody mosquitoes!'

'Tell me, what about hazelgrouse and capercaillie, are there any here?' asks another man, who up to now has been squatting in silence and occasionally poking the fire.

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'Yes, but not many.'

'And are you studying them too?'

'We only know that there aren't many. To study them you'd have to go somewhere else.'

'And why did they make you spend your time on those... what are they called again?'

'*Penochki* [warblers]?'

'Yes, that's it, *penochki*, *slivochki*¹, or whatever they are. The bureaucrats sit there on their backsides, order people to go off to the Devil knows where. Instead you could be getting to know something about capercaillie.'

'But why do you say "order"? And what's so special about capercaillie?'

Well, at least we agree that there are quite enough bureaucrats around. But it is not they who decide where we go or what birds we should study. The conversation turns into a mini-lecture. It is not always easy to explain to the uninitiated that animals worth studying do not always have to be big and edible. There are other things in this world worth our attention. You need to explain what sort of ecological problems there are, and how you choose model species for their investigation.

'So why can't you solve these problems using capercaillie?' The man squatting by the fire is not convinced.

'Maybe I'd like to,' I reply in conciliatory manner, trying to express regret, 'but it just so happens that capercaillie aren't suitable in this case.'

To change the subject I ask about the Aleutian canoes, and the discussion obediently turns to tourist and expedition equipment - always a subject of interest to travellers and rambblers.

It is soon time for us to go on. We say goodbye. The boat is seized by the current. The tents and people rapidly grow smaller and soon disappear around a bend.

We carry on a long way in silence.

'You really get on my nerves,' says Sergey suddenly, quietly.

What can I do but spread my arms in a gesture of resignation. It is not unexpected. We are human after all, and we need to communicate with a variety of other people. You soon get tired of a small circle, and especially of just one companion. This is an interesting subject, and we could go on about it at length. There is even a distinct branch of psychology concerned with relationships between people in a small group. This is not the first time that Sergey and I have worked together, and it is not always a smooth ride. But we make a good team. And now,

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at the end of the expedition, when the work is already finished, to hear a revelation of the kind Sergey has just expressed is not a calamity. It is merely a statement of fact.

As for the tourists, no problem: they are nice people. Of course for them we are not only a bit exotic, but also a kind of weird anomaly which they don't fully understand. Well, so what? People have a right to be different, to think and act not quite as other people do. And there is something good about that. These are the kinds of thought passing through my mind as I sit in the boat. And I also realise that now, given the mood I'm in, I am reacting to tourists in not quite the same way as on that occasion when I emerged from the sodden taiga to find the tent by the winter road. If I had gone up to that youth shivering by the refractory fire, I would no doubt have found him to be pleasant and welcoming. On consideration, I think I behaved badly.

And there is another thing I ought to recognise: envy. For a week or so those holiday makers are going to experience the excitement of shooting dangerous rapids, of which there are plenty in the headwaters of the Kozhim, and gain the satisfaction of achieving something difficult. They will see the real beauty of the mountains close to, and the natural life of the taiga. All in a week. We, on the other hand, were two months 'in' the Subarctic Urals - but never actually got near them. We were a stone's throw from famous peaks like Narodnaya and Manaraga, but never even saw them. Frustrating.

On the other hand we had Azhik, Zhak, Koka and the rest. It was a fascinating summer! Now I can even envy myself, because the field work has come to an end. It is almost twelve months before we get another chance.

It is already morning, and a beautiful sunny one it is too. We enter a wide reach, where the current is slow and there is absolutely no wind. A dog can be heard barking in the settlement. Of course this dog knows Vladimir Indyukov, whom we shall soon see again.

In the direction of the village a crow² flies above the trees. It is carrying an object in its bill - evidently something it has found on the rubbish dump. Now it flaps its wings vigorously, climbing steeply, lets the thing drop and immediately dives down to catch it in mid air. It repeats the whole process several times. The bird is simply playing. A lovely morning, sun, peace, a little something from the tip, and if the crow is in a good mood why on earth shouldn't it play?

Crows are generally very clever beings, and like many other intelligent animals they love to play. This corvid cleverness costs various other wild

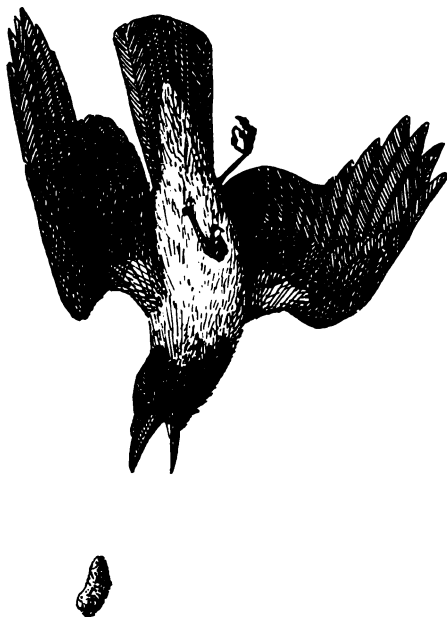
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creatures dear, among them other birds, since the crow is one of the most malicious ravagers of birds' nests. So, on the whole, we are not very fond of crows. This time, though, we watch the playful crow good humouredly, even with gratitude. For what? For the fact that there were none in the forest. Well, a pair visited us once in passing, that was all. Where we were, they were rather rare.

Generally we are very content. There is the sun, and the sky, and so much space. Below us, under the green darkness of the water, can be seen the shaggy growths of aquatic plants on rocks and pebbles. To the east, beyond several attractive curves in the bank of the Kozhim - like wings in a theatre - the snow-capped ranges of the Subarctic Urals soar into the air one after another. The scene is incomparably beautiful.

But after meeting the tourists, something in my soul shifts a little, or flickers. Episodes from quite a different life surface in my memory. Television, a hot bath, warm asphalt, the din of public transport, the hubbub of city streets.... Somewhere in that world, not so far away now, are the eyes and hands of loved ones and little ones. Memories of all this have emerged before now, but often only quietly, under the influence of a warm and gentle melancholy, when there was a breathing space, a break from work for a smoke in some thicket, when I'd sit in silence, completely alone. The usual guardedness held longing at bay, not letting it come too close to my throat. But now we are on our way home, and there is nothing to worry about. Especially since Sergey is sitting behind me, and cannot see my face.

We really are going home.



28. WRITING UP KAMEPAJKA

Once more back at our desks after post-expedition leave, we are getting down to working out the results. Our raw material takes the form of the field note books, pieces of tracing paper covered with symbols, nest filing cards, tape recordings and so on.

The most impressive item is the set of specimen tubes containing the preserved insects. Now all this material needs to be transformed into the language of numbers, charts, diagrams and graphs. Then it will be dignified with the title of 'data', and these data will enable us, first, to see what we have actually achieved and, second, to draw conclusions. The third stage will then be to write a scientific paper presenting the results in an intelligible form for the benefit of others.

Over the summer all sorts of routine business have accumulated, especially new journals and books which must be skimmed, some looked at more closely, and certain passages read in great detail. If you bear in mind that a large part of the scientific literature is in foreign languages, which we perhaps did not take as seriously as we should have at school and university, then you'll understand that such reading can be a wearisome process. From each publication on one's own subject, the essence must be extracted and transferred to punched cards, at the same time being classified by a code which takes the form of little nicks cut out of the edge of the card. Then, when certain pieces of information are needed, they can be located by the simple expedient of inserting knitting needles through the edges of several thousand cards¹. But you must be very careful about codifying the information on each card: nick the wrong hole, and the information will disappear without trace, after days wasted on translation.

The nest filing cards filled in during the summer are treated in the same way. Observations on each bird species also need to be transferred from the field notebook to punched cards - which of course must be classified, nicked and added to the card index already containing earlier years' observations, waiting to be used.

Other people handle their information differently. Each person has their own method and approach, but this is how we do it. Any kind of work demands time and energy, but different tasks can be alternated to avoid getting too fed up with the whole process.

When our entomologist Vladimir Nikolayevich - Volodya to us - sees the great palisade of specimen tubes containing our samples, he has

mixed feelings. Of course he naturally takes a professional interest in the preserved insects. But there are so many of them - at a provisional estimate several weeks of work bent over the binocular microscope.

But we are delighted to have, inside our own laboratory, someone who can give names to all these tiny creatures - each one's genus, family and order. And we, remembering the promise (perhaps hastily) made to us in spring, are happy to do all the preparatory work and wearisome analysis of the samples if we can simply sit and copy while he reels off the identifications.

To tell the truth, it is work of the most tedious kind. But at last there are no more samples to work their way from one end of the lab bench to the other. Nearly four thousand tiny living things - well, formerly living - have been identified, weighed and measured. The systematic list of invertebrate species fed by the warblers to their nestlings turns out to be huge - covering six sides of paper.

Of course the warblers' interest in the invertebrate world is merely gastronomic. If entomologists with their scientific approach could have made a collection in the taiga of the Subarctic Urals, the list would have been much longer. They would have included representatives of species the warblers did not collect simply because they do not eat them for reasons of taste. For instance it is well known that birds do not eat ladybirds²: they taste too bitter. A bird tries eating one only once, and acquires an aversion to them for the rest of its life. Carabid beetles³ smell foul, and moreover many of them are very large and hard. Other insects, such as springtails⁴, aphids⁵ and biting midges⁶, are so minute that it is not worth the birds' while collecting them. Yet others remain hidden, or fly too fast, and so avoid being caught.

Even so the warblers are pretty good at collecting insects. Some very rare specimens have turned up in the samples. And though they are somewhat the worse for wear, having experienced a bird's beak and gullet, then forceps and being squashed into a tube, they have earned their place in our and several other zoological museums.

Collectors do not work in quite the same way as our warblers do when gathering food. They usually want to capture insects not already in their collections, and soon lose interest in common and abundant species. The birds' needs are quite different, and this is especially helpful for us. We are particularly interested in how many of each type of insect there are in the samples from the willow warbler nestlings on the one hand and the arctics on the other. These figures will indicate the dietary preferences of each species. If the results for the two birds are

substantially the same, it means that they are collecting the same species of insect and in very similar proportions. And that is how it turns out: the two species have amazingly similar tastes. There is only one explanation: both species collect whatever they come across, more or less indiscriminately. And as they inhabit the same forest, so their spoils are much the same.

When the taped observations are decoded and all the information is quantified and analysed, the results confirm the impression we arrived at back on the banks of the Syvyu: there are no real differences in the methods and sites of feeding used by the two warblers.

This gives us cause to ponder - and ponder at length. Say what you like, our carefree warblers are blatantly disregarding a fundamental biological theory - the law of competitive exclusion. So we put on our thinking caps. We discuss theories and hypotheses, our own dreamed up in the camp and others too, old and new. We read, reread, think again, argue....

The results are published in a paper on the interrelationship of the willow and arctic warblers. We lay out the facts and share with our readers our ideas about the importance of competition in nature in various ecological situations, and about the evolutionary relationships between closely related species.

This is not the place to dwell upon the tortuous journey we made through the labyrinth of theories. But it is the theoretical implications that drive us on, and make other scientists carry out similar research.

29. WHY STUDY SMALL BROWN BIRDS? ЗАЧЕМ ИЗУЧАТЬ ПИЧУЖЕК?

Why does a zoologist choose one animal to study rather than another? Let's begin with the simplest case, where the animal itself is the reason for the investigation. For instance we need to study mosquitoes or mites - which carry encephalitis¹ - in order to protect ourselves against them and control them, without harming the rest of nature and our own health. The capercaillies, which the tourist from Moscow was so obsessed with, and also duck, grouse, elk, hares, sable², and so on, are studied so that we can use their meat and fur as natural resources, while at the same time not endangering their populations or indeed losing them altogether. Think of the bison³, polar bear⁴, right whale⁵, red-breasted goose⁶ and Siberian white crane⁷. These are all species which people used to hunt and which are now in the Red Data Book⁸.

WHY STUDY ... ?

The reason for studying these species is no less than to save them from extinction. It is also possible that some of them might still be of use to humans. For practically-minded people confronted with talk of saving species, the latter argument is the main and perhaps the only one. But the miserable utilitarianism of this approach to wild creatures is hard to stomach. Every species of animal and plant has the right to exist, no less than does *Homo sapiens*.

There is real benefit to be gained by studying birds which prey on insects harmful to agriculture. A similar justification can be given for the study and protection of raptors and owls, which save crops from rodents and act as cleansers of the populations they prey on, by removing sick and weak individuals. To be honest, the agricultural value of birds is often rather doubtful, and continues to find a place in school textbooks and popular literature more from inertia than anything else. But it was generally accepted about half a century ago, when people expected no 'favours from nature'⁹ and when absolutely every animal was simplistically and ruthlessly classified as 'useful' or 'harmful', and protected or persecuted accordingly.

All the same, why is it necessary to investigate the way of life and behaviour of some warblers, or other small birds for that matter? They are too puny to be counted as game, and live out their lives somewhere deep in the taiga where it is pointless to expect any benefits from them by way of pest control. Why study birds if they are not ... - well, capercaillie? If they cannot be eaten? Why spend time on other living creatures which have no bearing on the lives of people or humankind in general?

Let me introduce the tiny fruit fly¹⁰. Do you know it? It is very common indoors if there are fruit around, even if only now and then. It does not buzz unpleasantly like large flies, nor does it bite or carry infections. On the whole it is rather unobtrusive. What mockery and ridicule from their colleagues, and even persecution by the authorities, have been inflicted on biologists studying these unprepossessing, rather useless, and certainly harmless insects! But it was only a few decades ago that people came to realise what important contributions this *Drosophila* had made to understanding selection in crop plants and domestic animals, and to solving the riddle of hereditary diseases in humans. *Drosophila* has since become the best experimental animal for research into the laws of genetics, which are of enormous practical importance.

But we need to study every living creature on the planet. Any one of them might suddenly acquire practical significance. The scientific

knowledge we humans possess can be compared with a book, an unimaginably vast reference tome, in which it should be possible to find the answer to any question that may arise. The book grows ever larger, as corrections are made here, additions inserted there, and sections moved around. And the process will go on indefinitely. Research is necessary not only for practical reasons, but also simply to understand how the world works.

Plants and animals do not exist in a vacuum, but within natural communities where everything is interconnected. Each organism depends on others, and in turn determines to some degree the conditions in which the others live. Communities of functionally interdependent organisms are called ecosystems. Every school child now knows that. Living cells function according to certain laws, and organisms according to others. Ecosystems, in their turn, obey another set of laws. Competitive interactions are an important aspect of the life of organisms in communities, in ecosystems. So, by studying warblers we are also probing the general laws of competition in ecosystems.

Everything I have said about the importance of studying species can be applied equally to ecosystems. We ought to know how they work, so the knowledge can be used to our own advantage; but also so that we can prevent ecosystems from being damaged, and attempt to restore those that have already been wrecked.

30. ZOOLOGISTS AND WHAT THEY STUDY

О ЗООЛОГАХ И ИХ ОБЪЕКТАХ

We can admire the fragile beauty of a butterfly, and be amazed at the perfection of a beetle crawling along like a miniature steel robot. What a delight are the versatile movements of a cat, the quick-wittedness of a dog, or the song of a nightingale. There is no limit to beauty and perfection in the living world. But is everything beautiful in nature? Is every manifestation of life capable of arousing in us admiration, interest and sympathy?

Most people are not confronted by this question: they look if they want to, and if they don't they turn away. But we zoologists have an altogether more serious relationship with living creatures.

Once, long ago in our childhoods, ornithologists like myself were stricken by a passionate infatuation with birds. That is the reason why we now do this kind of work, and is probably what lends meaning to our lives. Every one of us, at least to some degree, will stick up for our own

specialism and profession, and almost every one of us admires the animals we work on. Birds are popular: there are more bird enthusiasts¹ than any other kind of amateur naturalist. This is true for every country: statistics prove it. Evidently the reason is that birds are active, easily seen, and in most cases very attractive creatures. If someone conducted a survey in the normal way, in the street or by telephone, and asked which wild animals people liked the most, I think that - the pathologically indifferent apart, and there are few enough of them - most would choose birds. At any rate I do not often have to explain to someone why I love and study birds rather than some other group of animals.

To a greater or lesser extent every naturalist loves every living creature. There are not many ornithologists who will say that they love birds and at the same time are entirely indifferent to all other forms of life. A love of biology and all life is determined partly by a certain fickleness in our attachments, as seen when somebody acquires a touching affection for some plant or animal which previously he or she could not tell apart from anything else.

More often than not a research worker begins studying a species on account of its suitability for solving this or that scientific problem. If the animal or plant did not already exert a particular attraction for the scientist, it might remain no more than a subject of research. But quite often things turn out differently. Sincere attachments can develop even towards creatures which to the man in the street are quite repulsive - such as certain parasitic worms.

What kind of affection - be honest! - could any normal person have for mosquitoes? Even when there are only a few of them, they are still irritating, and in average numbers make life difficult. The taiga mosquitoes can drive people to nervous breakdown, even to madness and death. That has happened. Living in the same forest with mosquitoes, many of us have come quite independently to the same simple conclusion: it is impossible to love nature in all its works.

A certain research worker - an entomologist - had since childhood been attracted to butterflies. She came to our institute to work on a very practical problem: she had to get to know all about the northern mosquitoes² - their way of life, what determines their numbers, and what can be done, not to exterminate them, but somehow to reduce the enormous psychological and economic burden they inflict on humans. It was a difficult task, and not only regarding the practicalities and methods of research. The problem occupies many research workers, and even whole institutes, all over the world.

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At the time, many of us were convinced that our new colleague - a sensitive and charming young woman - was doomed to at least several years of forced labour³ and murderously difficult work studying without enthusiasm our most malevolent of enemies. And we knew well enough that is exactly what the mosquitoes in the north really are. A sense of the practical importance of the work might conceivably imbue one with strength, conviction and even courage. But love? No, we expected hatred - and all the more so since, at university, Natasha was known for being highly emotional.

Incidentally, hatred can indeed be a motive for investigation. Think of spies and detectives: can they really like the objects of their work?

However, things did not turn out as we had expected. Natasha quickly acquired a tender affection for the mosquitoes - and a permanent one, too. Now, many years later, Natalya Vladimirovna⁴ is a leading light among the world's mosquito experts.

Perhaps I overrated the role of affection for one's subject of study as an inspiration for scientific creativity, particularly as the 'cult of the object' is often a hindrance in science. Sometimes for instance one species has to be swapped for another in the interests of solving the problem under investigation. Not everyone has the strength or courage to do that.

Research workers vary in personality and style of work. There are the dry rationalists, for whom the question of an emotional attachment to the subject of study does not arise. But personally I could not give up birds, and turn instead to fish or bats.

So far no-one has asked me to do that. Thank God!

ЕPILOGUE

ЭПИЛОГ

The winter went by, and new expeditions were planned. Sergey and I diverged geographically: he returned to Syvyu to continue studying the warblers, while I went to the tundra.

‘Give my greetings to all our friends there,’ I said to Sergey when we parted.

‘And greetings to the tundra!’

We were sure that some of our old acquaintances would return. Indeed many did. Azhik and Koka sang in their old haunts once more. Zhuzha however did not return. Perhaps he shunned a place with such unhappy memories, or he may simply have died: small birds have short lives.

One of the first arctic warblers to come back was Lazhik. This time he evidently remembered the inconvenience of the previous year’s arrangements, and immediately occupied the territory where Galya had built her nest in a vole hole. Galya also returned. But the female character is a rich source of mysteries. For her, marital bliss was now to be had with Mustang, who sang from the same tall spruce trees from which he had sung the previous year. Those two experienced conspirators, Galya and Mustang, appeared to pool their experience to prevent Sergey and his student assistant from finding out anything about their family life. When they were seen with insects in their bills, they ostentatiously swallowed the food themselves and invariably avoided leading their trackers to the nest.

Zhak once again had two wives, both new ones. But Zemfira cast a spell on the trusting Koka, and became his second spouse (again a second one). Sergey was probably quite right to call her Zemfira.

ЕPI-EPILOGUE

ЭПИ-ЭПИЛОГ

I wrote this little book a long time ago. But things did not go according to plan. It lay around unfinished for many years. Other work came along, other interests, other books. Experience accumulated, and I changed to other research topics and used different species of birds. Of course I too changed. As just one example, for a long time now I have not smoked. When I made the decision, proud of my courage in doing so, I was concerned that it might prove particularly difficult to abstain in

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the field. But it turned out that calm relaxation and contemplation of nature while sitting on a fallen tree or a tussock, or conversation with colleagues around the camp fire, was none the worse for being cigaretteless.

Our work is also a way of life. Long months of winter office work invariably alternate with two or three months on an expedition. Then again - winter; and again - expedition. All these years I have been working on the tundra. I cannot live without it. Sergey likewise has stuck to the northern taiga, and worked there, on the Syvyu, for ten years. Then one day excavators and bulldozers began to quarry in the area next to the control plot. Poor birds! However, over the years Sergey had accumulated a mass of interesting information about the warblers' lives, and at the same time about all the other inhabitants of the area.

If you recall each year, and compare one season with another, you realise that no two are exactly alike, even when they were spent at the same spot. Take spring, with its alternation of warm and cold weather, sun and snow, wind and calm - each time it unfolds in its own unique way. For me that summer on the Syvyu was quite special, since it was the only season I have spent in the taiga. For that reason my memories of it are particularly sharp and pleasant.

Then, one day, I pulled the manuscript out of the desk and read through it again. On consideration, there seemed to be something in it. Passages were rewritten, and other purely scientific and rather boring sections were jettisoned. When I went through the field notebook for that season from cover to cover, I recalled certain episodes and details which at the time had seemed of no interest, but which I now wanted to write about.

Expeditions can be variously categorised - short and long, difficult and easy, taiga and tundra (or steppe, tropics, and so on), sedentary and travelling, and in any other way you like. They can also be rated as successful and unsuccessful. Looking back on that season and comparing it with others, I can say that it was certainly successful. Even highly successful. For a start, the work went well, without any serious hitches. We obtained new and stimulating results. Our encounters with the wildlife of the place were interesting, and they all had happy outcomes - which is of some importance. Any failures and problems were quite bearable and capable of solution, in fact no more than minor irritations.

I am anxious that you, the reader of this book, should not be left with the impression that all our work consists of an endless series of discoveries and interesting encounters, and that our scientific

EPI-EPILOGUE

endeavours, while they do lead us down some blind alleys, are always absorbing and productive.

Instead everything can be, and often is, much worse - more boring and less successful.

We could have seriously miscalculated from the very beginning if, owing to poor information, we had made mistakes in planning the study, its site and timing, and the equipment required. One of us might have caught a cold, sprained an ankle or been knocked out by a falling tree during the storm. Well, so what? Anything might have happened which we could not have coped with. If we had had bad luck, we would have had to put up with it. So it is no meaningless gesture to wish our friends well each year on their expeditions, and afterwards to be eager to know that all did go well.

It can happen that you slave away, doggedly and conscientiously collecting information, then do calculations and analyse it all. And finally you land up with a set of figures which tells you nothing about anything. Or they might tell you that the whole thing should have been done differently.

I am deliberately saying all this now for the sake of those young people who avidly read books on nature and are thinking seriously about dedicating themselves to science. Don't rush into it. Don't raise your hopes too high. Unfortunately there are plenty who regret it, or lose interest, or get tired of it, or find something better. Meanwhile years have gone by, and it is soon too late to make a fresh start.

If however you take this road, then I hope you'll be able to say, as I sincerely do say, and as do many of my colleagues, 'There is no better occupation in the whole world.'

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Примечания

TRANSLITERATION AND PRONUNCIATION OF RUSSIAN WORDS

Since some readers of this book may be students of Russian, or may acquire an interest in the language while reading it, certain Russian words have been left in the text as transliterations. Cyrillic words in the notes are also transliterated, including underlining to show where the stress falls. (Where a word is already in the English language, such as 'taiga', that spelling is used and may not be the same as the transliteration.)

The transliteration serves the purpose of showing the spelling, and is not primarily a guide to pronunciation. In most cases, however, Russian pronunciation follows the spelling fairly closely and can often be achieved reasonably accurately from the transliteration using the following rules. Transliterations and pronunciation are given in parentheses.

The 'hard vowels' correspond more or less to the vowels of English: а (a); э (an uncommon letter: e, pronounced like 'e' in 'ed'); ы (y, pronounced something like 'i' in 'fit' but with the tongue further back in the mouth); о (o); у (u, pronounced 'oo').

There is however another set of vowels, these being the palatalised equivalents of the above. They are pronounced with the tongue starting off more or less in the position for English 'y'. Thus: и (i, like 'ee' in 'tweet'); я (ya); е (e, or ye where it is the first letter of the word or is immediately preceded in the same word by another vowel; pronounced like 'ye' in 'yes'); ё (e, but pronounced 'yo' as in 'yoghurt' and always stressed); ю (yu, pronounced 'you').

Finally there is an eleventh vowel й (also transliterated y) which only appears in diphthongs. Thus ай (ay) is pronounced 'eye'. However the masculine adjectival endings -ый and -ий are rendered merely as (y) and (i) to avoid the ugly 'yy' and 'iy'.

'Hard consonants' are pronounced much as in English: б (b); в (v); г (g); д (d); ж (zh, pronounced like 'sh' but voiced); з (z); л (l); м (m); н (n); п (p); р (r); с (s); т (t); ф (f); х (kh, pronounced like 'ch' in Scottish or German 'loch/Loch'); ц (ts); ш (sh). Some of these letters are from the Greek alphabet.

The corresponding palatalised consonants are pronounced with the tongue, as far as possible, in the position for saying the 'y' sound, in other words near the roof of the mouth. Any consonant, including those already listed, immediately followed by a palatalised vowel or a soft sign ь ('), is itself palatalised, but others are always palatalised and have their own letters: ч (ch, pronounced like 'ch' in 'chatter'); щ (shch, the palatalised form of ш).

Pronunciation sometimes depends heavily on whether the sound is stressed. Thus 'o' degenerates into an 'a' sound when unstressed and in the first syllable of a word, or in the syllable immediately preceding the stressed one; in other unstressed syllables it becomes merely the 'e' sound in 'butter'. Consonants too sometimes 'degenerate' if they are at the end of a word, in the sense that they are not voiced. Thus дрозд (drozd, meaning 'thrush') is pronounced like 'drost'.

Space permits here only a very condensed guide to the pronunciation of this beautiful language. Interested readers are recommended to find a more comprehen-

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sive treatment of the subject in a language course (book, cassette, evening class, &c), and/or visit Russia. It is appropriate for a natural history book that Russian has so many palatalised sounds, since this makes it especially good at rendering many bird songs and calls, particularly the thrush nightingale's, as transcribed by Professor D.N.Kaygorodov:

фи-тчурр, фи-тчурр, вад-вад-вад-вад-ции; тю-лит, тю-лит, тю-лит; клю-клю-клю-клю; юу-лит, юу-лит; ци-фи, ци-фи, ци-фи; пью, пью, пью, пью; ци-фи, ци-фи, чочочочочочо-вит; цици-вит, тю-вит, тю-вит; юу-лит, чочочочо-тррр-ц; пи-пи-пи-пи, клю-клю-клю-клю; чричи-чу, чричи-чу, чричи-чу; цивит(quiet), клюи(loud), клюи(very loud),

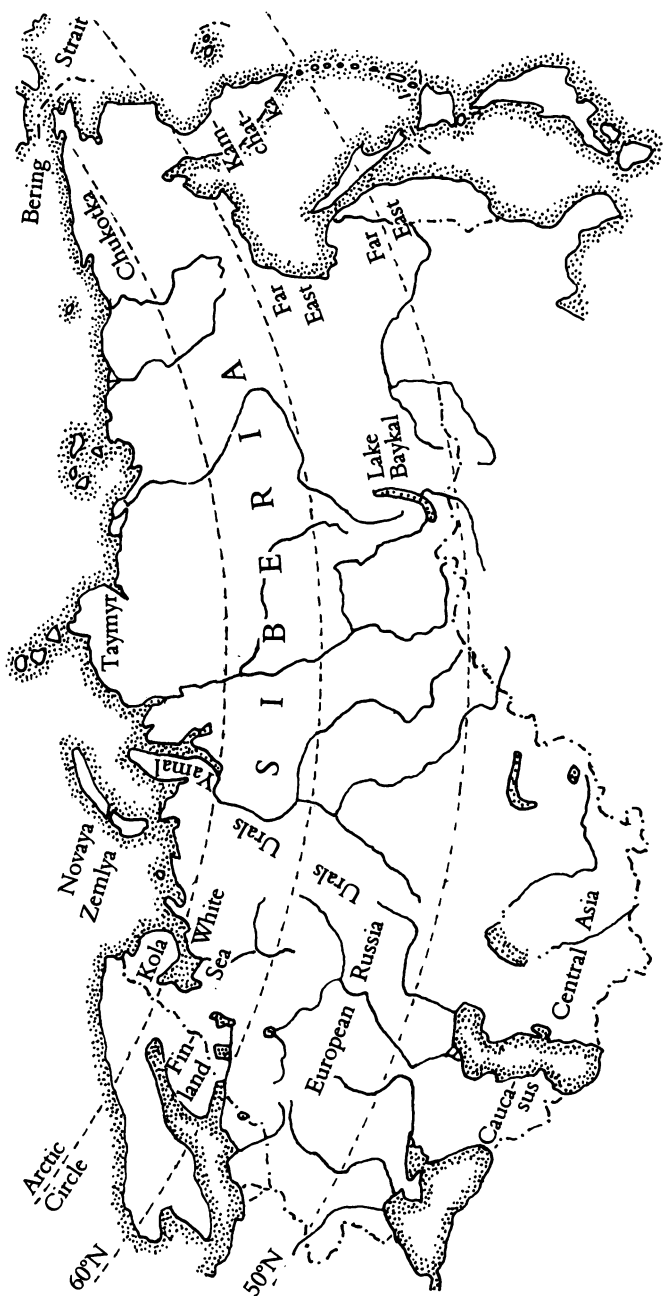
(Ф.Ф.Остапов «Певчие птицы нашей родины», Москва, 1960)

NOTES ON THE CHAPTERS

In the following notes English, Latin and Russian names of species are given, the last in cyrillic and then, in parentheses, in transliteration. The underlined letter in each transliteration shows which syllable is stressed. When an English word is referred to it is enclosed in inverted commas, although this is not done for Russian words, to avoid confusion with the inverted comma used in the transliterations to indicate the soft sign.

For readers interested in the origins of the Russian names of species, similar and possibly related words are sometimes added, although these are not an authoritative guide to etymology.

A rough guide to species' distributions within the CIS is given. Some sources are unreliable and some distributions not well known, so that 'rough guide' must be taken literally. The CIS is the Commonwealth of Independent States, comprising all of the former Soviet Union except the three Baltic States (Estonia, Latvia and Lithuania).

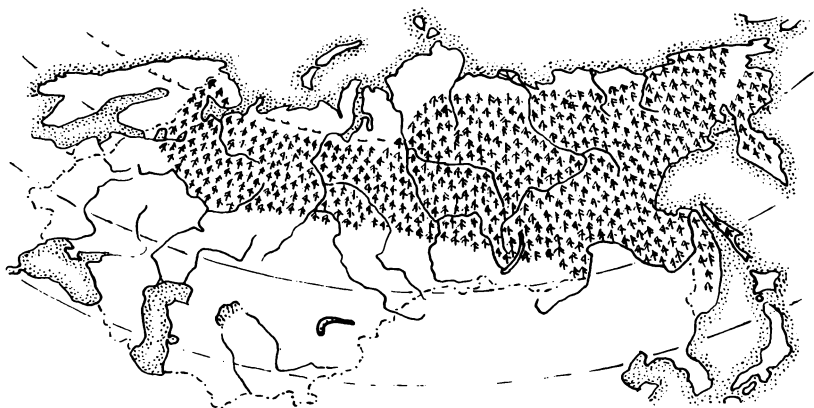


1. IT ALL DEPENDS ON THE GOAL

¹ Willow Warbler *Phylloscopus trochilus*, пеночка-весничка (penochka - leaf warbler; vesnichka; peniye is singing, so penochka is literally 'warbler'; весна/vesna is 'spring'). For range see map on page 2.

² Arctic Warbler *P. borealis*, пеночка-таловка (talovka; тал/tal or тальник/tal'nik is 'osier-bed' or certain species of willow). For range see map on page 2.

³ The taiga (тайга/taiga, but pronounced in English *ta*yga, like 'tiger') is the boreal conifer forest that stretches all the way from Scandinavia to the Pacific Ocean, forming a broad band between the treeless tundra to the north and the mixed and broad-leaved forest, or sometimes steppe, to the south. The predominant trees in the taiga are usually various species of spruce, pine and larch. See map below.



⁴ The Urals are a mountain chain of great geomorphological interest, extending north from near 50°N almost to the Arctic Ocean, and then snaking their way (under another name) into the sea as the spine of Novaya Zemlya. Being much eroded they are nowhere very high, but are what remains of the mountains thrown up by the collision of two continents at the end of the Permian to form the supercontinent Pangaea.

The Prepolar (or Subarctic) Urals Приполярный Урал extend from about 64 to about 66°N, with the Polar (or Arctic) Urals Полярный Урал further north still. The events in this book take place at the northern end of the Prepolar Urals.

2. WE SET OFF

¹ 'Mist nets' in Russian is паутинные сети/pautinnyye seti, meaning literally 'spider's-web nets'.

² The nightingale found throughout most of European Russia and into southern Siberia is the Thrush Nightingale *Luscinia luscinia*, обыкновенный соловей

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(obyknovenny - common; solovey - nightingale). The nightingale *L. megarhynchos* found in Britain occurs only in the far south of Russia, the Caucasus and Central Asia.

³ Founded in 1723 by Peter the Great, Sverdlovsk was named by him Yekaterinburg (or Ekaterinburg) in honour of his wife Ekaterina. The last tsar, Nicholas II, and his family were shot in the town in 1918, and their remains were discovered in 1991. The town reverted to its former name in 1992. It is the town where Boris Yeltsin lived and worked for many years.

⁴ The tundra is the vegetated but treeless zone to the north of the taiga and forest-tundra, extending from Scandinavia to the Pacific.

⁵ Yamal Peninsula/Ямал: a large area of land, mostly not more than 50 m above sea level, north of the Arctic Circle; it forms the west bank of the Ob Gulf, and has the Kara Sea on its other side.

⁶ Corncrake *Crex crex*, коростель (korostel'). Widespread across most of European Russia and into Siberia, to the northern taiga.

⁷ Spotted Crake *Porzana porzana*, погоныш (pogonysh). With a distribution rather similar to that of the corncrake, but extending to the Arctic Circle.

⁸ Lapwing *Vanellus vanellus*, чибис (chibis, presumably onomatopoeic and the equivalent of English 'peewit', German 'Kiebitz', Dutch 'kievit', and so on). Widespread across European Russia and into southern Siberia.

⁹ Common Snipe *Gallinago gallinago*, бекас (bekas). Widespread across the whole of northern and central European Russia and Siberia.

¹⁰ Ruff *Philomachus pugnax* (reeve is the female), турухтан (turukhtan). Widespread through western European Russia, but eastwards becoming progressively restricted to the far north.

¹¹ Indyukov: индюк/indyuk means 'turkey'.

¹² птичники/ptichniki means 'poultrymen' as well as anyone with an interest in birds.

¹³ Ты/ты: the familiar form in Russian of 'you', similar to German 'du' and French 'tu'.

¹⁴ The Komi Republic is a vast area in northern European Russia, stretching from its capital Syktyvkar in the south-west to the Urals in the east. The railway line neatly bisects the republic and extends north-east to Vorkuta at the far north end of the Urals.

¹⁵ ДЭТА/ДЕТА or диэтилтетрамид; cf. 'deet', diethyltoluamide, an insect repellent.

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¹⁶ Common Gull *Larus canus*, сизая чайка (sizaya - blue-grey; чайка - gull). Occurs across northern Russia from Scandinavia to the Pacific.

¹⁷ Terek Sandpiper *Xenus xenus*, мородунка (morodunka). Occurs across northern Russia from Finland nearly to the Pacific, mostly south of the Arctic Circle. The bird's bill curves gently upwards, like a Curlew Sandpiper's upside down. Named after a river in the northern Caucasus.

¹⁸ 'Kurruy' is very similar to the Russian word курю/куру meaning 'I smoke'.

¹⁹ Chaffinch *Fringilla coelebs*, зяблик (zyablik). Its range extends through European Russia down to the Caucasus and into southern West Siberia. On the Urals it is normally far to the south of the Arctic Circle.

3. TERRITORIALITY

¹ Like the English 'cock-a-doodle-doo', кукареку/kukareku is emphasized on the last syllable.

4. NEW BIRDS, NEW SONGS

¹ сажень (sazhen' or sazhen'): an old Russian unit of length equal to 2.13 metres. Here the word is used to denote a simple device for measuring out distances of 2 m.

² Ringers in the UK use rings marked 'INFORM BTO BRITISH MUSEUM NAT.HIST.LONDON' or something similar, and likewise each country with a bird-ringing (bird-banding) programme has its own ringing centre. Anyone finding a ring on a dead bird should take it off and send it, with as full details as possible of the species, sex, age, date, where found, how killed, &c, to the ringing centre named on the ring. In this way an enormous amount of valuable information about birds is being obtained.

³ Bluethroat *Luscinia svecica*, варакушка (varakushka). Almost everywhere in Russia and Central Asia, except south-east Siberia.

⁴ Brambling *Fringilla montifringilla*, व्यюрок or юрок (v'yurok or yurok; юркий/yurki means 'brisk, lively'; or the name may be onomatopoeic). Northern Russia from Finland to Kamchatka.

⁵ Little Bunting *Emberiza pusilla*, овсянка-крошка (ovsyanka - bunting; kroshka - crumb). Occurs all the way from Scandinavia to the Bering Strait in the southern tundra, forest-tundra and northern taiga. The forest tundra is a zone intermediate between the taiga and tundra, with scattered conifers.

⁶ сушиллка/sushilka: drying frame or drying room. сухой/ sukhoy means 'dry'.

⁷ Redwing *Turdus iliacus*, дрозд-белобровик or simply белобровик (drozd - thrush,

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cognate with German 'Drossel' and English 'throstle' and 'thrush'; belobrovik - white brow). Widespread through northern European Russia and western Siberia, and penetrating eastern Siberia in the north.

⁸ Song Thrush *T.philomelos*, певчий дрозд (pevchiy - song). Widespread in the forested regions of European Russia, the Caucasus, and Siberia.

⁹ Fieldfare *T.pilaris*, дрозд-рябинник (ryabinnik - referring to рябина/ryabina - rowan or mountain ash). Widespread across European Russia and Siberia, but not reaching the Pacific.

¹⁰ Woodcock *Scolopax rusticola*, вальдшнеп (val'dshnep, from German 'Waldschnepfe', literally 'wood snipe').

Turgenev introduced the German name, which was also adopted by Aksakov, so the old name *слука/sluka* fell into disuse.

The forested regions of European Russia, the Caucasus, and Siberia.

¹¹ Redstart *Phoenicurus phoenicurus*, горихвостка (gorikhvostka; гореть means 'to burn'; khvost is 'tail', as is the Middle English word 'stert'). Across European Russian and into Siberia.

¹² Black- or Dark-throated Thrush *Turdus ruficollis atrogularis*, чернозобый дрозд (chernozoby drozd; чёрный, pronounced chorny, is 'black', zob is 'throat'). Mostly in western and central Siberia south of the Arctic Circle.

¹³ Hazelhen or Hazel Grouse *Tetrastes bonasia*, рябчик (ryabchik; рябой/ryaboy means 'speckled'). All the way across northern Russia from the Baltic to the Pacific. Traditionally considered a delicacy in both Russia and China.

5. NO MAN'S LAND?

¹ каша (kasha) is porridge made from oats, maize, rice, or other cereal.

² *пыжиться/pyzhit'sya* means 'to strut about, making yourself look big'; *пыжик/pyzhik* is a young deer, or a murrelet (auk) of the genus *Brachyramphus*; *чижик-пыжик* (chizhik-pyzhik) is the name for the Siskin *чиж/chizh*, in a well-known children's song. See chapter 6, note 8.

³ There is a similar no-man's-land between villages in parts of Burkina Faso: 'Bekannte Konfliktzonen. In diesem Fall ist extreme Vorsicht geboten. So ist beispielsweise in Burkina Faso "das Laufen auf der Dorfgrenze" ein lokales Tabu, wahrscheinlich, um offene Konflikte zu vermeiden' (S.Groten 'Luftbilder als Kommunikationsmittel in der Landnutzungsplanung', Entwicklung und Ländlicher Raum 2/96, pp.14-17).

⁴ Red-throated Pipit *Anthus cervinus*, краснозобый конёк (krasnozoby kon'ek, pronounced konyok; красный/krasny - red; zob - throat; конь/kon' is 'horse', or

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'knight' in chess, and конёк is a diminutive form). Mostly north of the Arctic Circle, from the Kola Peninsula to Chukotka on the Pacific.

⁵ Common Sandpiper *Actitis hypoleucos*, перевозчик (perevozchik; also means 'ferryman' or 'boatman'). Across the whole of the CIS from the southern borders to well north of the Arctic Circle.

⁶ Red-breasted Merganser *Mergus serrator*, длинноносый крохаль (dlinnonosy - long-billed; krokhāl'). Across the whole of Russia, confined to the north in the west, but extending far to the south in the Far East.

⁷ Teal *Anas crecca*, чирок-свистунок (chirok-svistunok; свистун/svistun means 'whistler'). Throughout Russia.

⁸ Dipper *Cinclus cinclus*, оляпка (olyapka). Occurs in upland areas such as the Urals, Caucasus and the mountains of Central Asia and southern Siberia.

There is another species - the Brown Dipper *C. pallasii*, without the white breast patch - which occurs in the mountains of Central Asia, the Far East and Kamchatka.

⁹ Green Sandpiper *Tringa ochropus*, кулик-черныш (kulik - wader; chernyush; чёрный, pronounced chorny, means 'black'). Most of Russia from the Baltic to the Pacific, but not extreme eastern Siberia.

6. GETTING ACQUAINTED, WEDDINGS, SETTING UP HOUSE

¹ шалашик (shalashik), diminutive of шалаш (shalash), which is a hunter's or fisherman's shelter made from branches and herbage. The willow warbler's nest is roofed over with grass or other plants and has a side entrance.

² Common or Black Scoter *Melanitta nigra*, синьга (sin'ga). Occurs (summer) from the Kola Peninsula to Kamchatka in the tundra and northern taiga.

³ False Hellebore *Veratrum* (Liliaceae), чемерица (chemeritsa). Belemnites are cephalopod fossils looking rather like bullets. Young *Veratrum* plants are one of the most attractive features of the early summer taiga, with pale green, strongly plicate leaves; irresistably photogenic.

⁴ Asian or Pin-tailed Snipe *Gallinago stenura*, азиатский бекас (aziatski - Asian; bekas - snipe). From the northern Urals eastwards through most of Siberia.

⁵ Eurasian Cuckoo *Cuculus canorus*, кукушка (kukushka). The whole of the CIS except for the tundra.

⁶ Oriental Cuckoo *C. saturatus*, глухая кукушка (glukhaya; глухой/glukhoy usually means 'deaf', but can also refer to a flat, dull, indistinct sound). From the White Sea eastwards through Siberia to the Pacific, except tundra. See chapter 12, note 2.

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⁷ Yellowhammer *Emberiza citrinella*, обыкновенная овсянка (obyknovennaya - common; ovsyanka - bunting, but it can also mean 'porridge'; овёс, pronounced avyos, is 'oats'). European Russia and Siberia as far as Lake Baykal, except tundra.

⁸ Siskin *Carduelis spinus*, чиж (chizh, presumably onomatopoeic). Most of European Russia, the Caucasus, and south-east Siberia.

⁹ Blyth's Reed Warbler *Acrocephalus dumetorum*, садовая камышёвка (sadowaya - garden; kamyshevka, pronounced kamyshofka; камыш/kamysh means 'reed'). Most of European Russia and western Siberia, but well south of the Arctic Circle.

¹⁰ Оляпочьи камень (olyapoch'i - dipper, see chapter 5, note 8; kamen' -stone, rock).

¹¹ The Russian белая ночь (belaya noch') or white night is the summer night in northern latitudes when it never really gets dark; in Shetland called the 'simmer dim', when the Shetland Times can be read at midnight out of doors..

¹² Elk (Moose in America) *Alces alces*, лось (los'). Widespread throughout the forest zones of Eurasia and N.America.

¹³ Arctic or Blue Hare *Lepus timidus*, заяц-беляк (zayats - hare; belyak: белый/bely means 'white'). Range similar to that of the elk, and also extending into the southern tundra.

¹⁴ Reindeer (Caribou in America) *Rangifer tarandus*, северный олень (severny - northern; olen' - deer). Originally occurred all over the tundra and part of the taiga, but now absent from much of its former range, or present only as domesticated herds.

¹⁵ Brown Bear *Ursus arctos*, бурый медведь (biry - brown; medved' - bear: мёд, pronounced myot, is 'honey'). Widespread throughout the forest zones.

¹⁶ Bast sandals лапти/lapti: traditional footwear made from bast (луб/lub, лыко/lyko, or мочало/mochalo), which is the inner layer of bark from the lime tree (липа/lipa), or similar material.

¹⁷ These монтерские когти (pronounced montyorskiye; kogti; literally 'fitter's claws') are not really like the crampons we might be used to. They are about 30 cm long, fitted under the boots, and terminate at the toe in a large hook that gives a grip.

¹⁸ Siberian Tit *Parus cinctus*, сероголовая гайчка (serogolovaya - grey-headed; gaychka - tit). Occurs all across Russia from west to east, but in European Russia no further south than St Petersburg.

¹⁹ Willow Tit *P. montanus*, пухляк or буроголовая гайчка (pukhlyak: пухлый/pukhly means 'plump'; burogolovaya - brown-headed). Occurs all the way across Russia south of the Arctic Circle, where there are trees.

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- ²⁰ Siberian Accentor *Prunella montanella*, сибирская завирушка (sibirskaya - Siberian; zavirushka - accentor). East from the Urals to north-east Siberia, also in southern Siberia and the Far East.
- ²¹ Haircap Moss *Polytrichum*, кукушкин лён (kukushkin - cuckoo; len, pronounced lyon - flax).
- ²² Blackcock: male of Black Grouse *Tetrao tetrix*, тетерев (teterev). Occurs in most of Russia's forest zones, as far north as the Kola Peninsula in the west, but in the east much further south. There is another species in the Caucasus - the Caucasian Black Grouse *L.mokosiewiczzi* - with not quite such a curved tail.
- ²³ зима/zima means 'winter'.
- ²⁴ A druse is a crystal formed on the internal surface of a cavity inside a rock.
- ²⁵ бусинец/businets: бусина/busina means 'bead'.
- ²⁶ Meadow Pipit *Anthus pratensis*, луговой конёк (lugovoy - meadow; konyok - see chapter 5, note 4). European Russia as far as the Urals, and in part of western Siberia.
- ²⁷ Common Redpoll *Acanthis flammea*, обыкновенная чечётка (obykonnennaya - common; chechetka, pronounced chechotka - redpoll or twite). Across the whole of northern Russia.
- ²⁸ Common or Red Crossbill *Loxia curvirostra*, клёст-еловик (klest, pronounced klyost - crossbill; yelovik: ель/yel' means 'spruce', referring to this crossbill's main diet of spruce seeds). Across most of northern Russia except the tundra.
- ²⁹ Bohemian Waxwing *Bombycilla garrulus*, свиристель (sviristel'; свиристеть/sviristet' means 'to whistle shrilly, with hissing or squeaking elements in the sound'). Across the whole of northern Russia to Kamchatka.
- ³⁰ Chiff-chaff *Phylloscopus collybita*, пеночка-теньковка (penochka - leaf warbler, see chapter 1, note 1; ten'kovka: тень/ten' means 'shade', but the name is probably onomatopoeic: just as in English it sings 'chiff-chaff-chiff' and in German 'tsilp-tsalp-tsilp', so in European Russia it is 'тень-тянь-тинь-тень'). In Siberia, and also the Subarctic Urals, the species has a different song. Range almost the same as the Willow Warbler, but extending further south and not quite to the Pacific.
- ³¹ The reference is to one of A.M.Gorki's stories, 'Песня о соколе' (pesnya o sokole - the song of a falcon).
- ³² Willow Grouse or Willow Ptarmigan *Lagopus lagopus*, белая куропатка (belaya - white; kuropatka - grouse). The whole of northern Russia as far as the Arctic coast. In Russia the plumage goes white in winter, whereas in the British subspecies (Red Grouse) it does not.

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³³ тушёнка (pronounced tushonka) is tinned stew.

³⁴ Grey Wagtail *Motacilla cinerea*, горная трясогузка (gornaya - mountain; tryasoguzka - wagtail: трясти/tryastj is 'to shake'). This species has an unusual distribution. In the CIS it is widespread in the Urals and eastwards to the Pacific south of the Arctic Circle, and otherwise is a bird of uplands (Caucasus, Central Asian mountains, Carpathians). Apparently reached Central Europe only in the mid 19th C.

7. A LITTLE MORE ON INTERSPECIFIC TERRITORIALITY

¹ The Russian word пеночка (penochka) is used for leaf warblers of the genus *Phylloscopus*. See chapter 1, note 1.

² передник/perednik means 'apron', so задник/zadnik is a sort of bum apron; it also means 'backcloth, backdrop' in the theatre. It is made of deer skin or thick plastic, and hangs from the belt [- and a very useful invention, as I know from experience with the author in a Russian bog - Translator].

³ The Russian word used here is улит/uljt, for which there is no English translation. It covers *Tringa*, *Actitis*, *Xenus*, and *Heteroscelus* waders, namely some of the sandpipers as well as red- and green-shanks and tattlers (subfamily Tringinae).

8. THE DEMISE OF KACH

¹ The reference here is presumably to the bird's surface area/mass ratio: other things being equal, a small bird cools down by losing heat through its surface much faster than if it were the size of a human.

² Кто такой? Почему не знаю? (Kto takoy? - Who is this?; pochemu ne znayu? - why don't I know him?).

³ Akakiy Akakiyevich, a junior civil servant much abused by his superiors, is the main character in Gogol's story 'The Overcoat' (Шинель/Shingl'). (Incidentally, роголь/gogol' means 'goldeneye'.)

9. REMINISCENCE: THE BALALAIKA

¹ домра/domra is an instrument like a mandolin.

² гусли/gusli (a plural noun) is/are a psaltery.

³ частушка/chastushka is a lively sung 2- or 4-line verse on some topical or humorous theme.

10. WHERE THE ARCTIC WARBLERS SETTLE DOWN

¹ Красота спасёт мир (Krasota spasyyot mir - beauty will save the world).

² Short-winged or Indian Cuckoo *Cuculus micropterus*, индийская кукушка (indiyskaya - Indian; kukuushka - cuckoo). Very rare, occurring only in the southern Far East and migrating to south-east Asia for the winter.

³ According to Adriaan Kortlandt (*New Scientist* 13 May 1995, letter), the Mbuti pygmies of eastern Zaire use bird calls to communicate with each other in rain forest, avoiding speech. Apparently their aim is to remain undetected by antelopes and other game.

12. MUSTANG

¹ In one of his books (*Raggylug*) Ernest Thompson Seton used an animal character - The Pacing Mustang - to symbolise Love of Liberty.

² Western Capercaillie *Tetrao urogallus*, глухарь (glukhar'; глухой/glukhoy is 'deaf', but see chapter 6, note 6). Central and northern European Russia, and western and central Siberia. Another species, the Black-billed Capercaillie *T. urogalloides*, overlaps with the Western Capercaillie in central Siberia, and extends eastwards to the Pacific. See chapter 6, note 6.

³ Northern Hawk Owl *Surnia ulula*, ястребинная сова (yastrebinaya sova; ястреб/yastreb is 'hawk'). Throughout the taiga of European Russia and most of Siberia.

13. VOLES

¹ Northern Red-backed Vole *Clethrionomys rutilus*, красная полёвка (krasnaya - red; polevka, pronounced polygvka - vole; 'vole' comes from a Scandinavian word meaning 'field', so 'field vole' sounds a bit comical to the etymologist; and поле/pole also means 'field' - are 'vole' and поле cognate?). In European Russia found north of a line from St Petersburg to the southern Urals, and throughout Siberia to the Pacific coast, except for most of the tundra; also North America.

² кисель/kisel' is kissel, a sort of blancmange or purée.

³ kasha: see chapter 5, note 1.

⁴ Wolverine or Glutton *Gulo gulo*, росомаха (rosomakha, from a Finnish word meaning 'inhabitant of rocky places'). Throughout the taiga and forest-tundra zones of Eurasia; also North America.

14. NEW MYSTERIES

¹ This refers to the Russian passion for fungus hunting and berry picking in the autumn.

ONE SEASON

² A.A.Milne's Winnie-the-Pooh books are popular in Russia. My copy is attractively designed and illustrated: А.А.Милн *Винни-пух и все-все-все, пересказал Борис Заходер* (retold by Boris Zakhoder), Moscow: Detskaya Literatura, 1965.

³ See chapter 4, note 2.

15. REGIME 24-12

¹ The *ненцы* (Nentsy, singular *ненец*/Nenets) are the native people of the Yamal Peninsula. Their traditional occupations are reindeer herding and fishing. The *чум*/chum is a dome-shaped dwelling covered in reindeer hides.

16. THE ELEMENTS SET UP AN EXPERIMENT

¹ White Wagtail *Motacilla alba*, белая трясогузка (belaya - white; tryasoguzka - wagtail). Found everywhere as far as the Arctic coast. See chapter 6, note 34.

² Sparrowhawk *Accipiter nisus*, перепелятник (perepelyatnik). Throughout the taiga and further south, from the Baltic to the Pacific.

³ shalashik: see chapter 6, note 1.

⁴ Weasel *Mustela nivalis*, ласка (laska). Throughout most of Eurasia.

⁵ The *лучок*/luchok is a net held in a more or less circular frame which is actually made up of two semicircles joined by hinges. To set it, one semicircle is pinned to the ground with the nest (also on the ground) between the hinges, and the other semicircle is folded back onto the first, with the net folded between them. Pulling the string flips the upper semicircle over the nest which is then in the middle of, and underneath, the net.

⁶ Stoat *Mustela erminea*, горноста́й (gornostay). Range similar to that of the weasel, somewhat less widespread.

17. ENCOUNTER WITH THE TUNDRA

¹ Common Scoter. See chapter 6, note 2.

² Dotterel *Eudromias morenallus*, хрустан (khrustan; хруст/khrust is 'crunch' or 'crackle', eg. the crunching of snow). Distribution patchy, including the Kola Peninsula, Novaya Zemlya, the Urals, Altai and Sayan mountains, and northern Siberia.

³ Greater Golden Plover *Pluvialis apricaria*, золотистая ржанка (zolitistaya - golden; rzhanka - plover; ржать/rzhat' is 'to neigh'). St Petersburg area and the far north from the Kola Peninsula eastwards to southern Taymyr.

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The Lesser Golden Plover *P. dominica* overlaps the range of *P. apricaria* from the Yamal Peninsula to southern Taymyr, and then extends on to Chukotka.

⁴ Long-tailed Skua *Stercorarius longicaudus*, длиннохвостый поморник (dlinnokhvosty - long-tailed; pomornik - skua or jaeger). Near the sea, all the way from the Kola Peninsula to Kamchatka.

⁵ The spruce in the Urals is *Picea obovata*.

⁶ Black-throated Thrush. See chapter 4, note 12.

⁷ European Robin *Erithacus rubecula*, зарянка (zaryanka; заря/zaryu is 'dawn' or 'dusk'). European Russia and the Caucasus, also penetrating a short way into Siberia

⁸ Red-flanked Bluetail or Orange-flanked Bush-robin *Tarsiger cyanurus*, синехвостка (sinekhvostka; синий/sini - blue; хвост/khvost - tail). Most of Siberia south of the Arctic circle, and extending as far as Scandinavia.

⁹ Larch *Larix sibirica*, лиственница (listvennitsa; лиственный/listvenny is 'deciduous').

¹⁰ Alder *Alnaster fruticosa*, ольха (ol'kha).

¹¹ Dwarf Birch *Betula nana*, ерник (yernik). There are at least nine species of *Betula* occurring in the Urals; both *nana* and *tundrarum* are found in the tundra as dwarfs.

¹² Forest tundra: vegetation intermediate between taiga and tundra, effectively tundra with thinly scattered trees, or with irregular clumps of trees.

¹³ Pine Grosbeak, or Pine Rosefinch *Pinicola enucleator*, шур (shchur). Northern European Russia, but in Siberia extending further south.

¹⁴ Bog Bilberry *Vaccinium uliginosum*, голубика (golubika; голубой/goluboy is 'pale blue', 'sky blue' - referring to the bloom-covered berries.

¹⁵ Crowberry *Empetrum* sp, шикша (shiksha). *E. nigrum* and *E. hermaphroditum* both occur in the Urals.

¹⁶ Northern Wheatear *Oenanthe oenanthe*, обыкновенная каменка (obyknoennaya - common; kamenka - wheatear; камень/kamen' is 'stone'). Almost everywhere in the former Soviet Union as far as the Arctic coast.

¹⁷ Northern Pika (Rock Cony, Whistling Hare) *Ochotona hyperborea*, северная пищуха (severnaya - northern; pishchukha - pika; пищать/pishchat' is 'to squeak'). It constructs piles of vegetation and so is also known as сеноставка/senostavka (сено/seno is 'hay'). Inhabits mountains in the northern Urals and in most of Siberia east of the Yenisey.

ONE SEASON

¹⁸ мумиё (mumiye, pronounced mumiyo).

19. HOW TO FIND NESTS

¹ Juniper *Juniperus communis*, можжевельник (mozhzhevel'nik).

² В споре рождается истина (V spore rozhdaet'sya istina): truth will out in a quarrel.

³ The Russian phrase танцевать от печки (tantsevat' ot pechki) means 'to begin at the beginning', or literally 'to dance from the stove'. The stove is the large brick structure at the centre of a traditional Russian house and used for heating.

20. THEIR DAILY BREAD

¹ Eurasian Nuthatch *Sitta europea*, поползень (popolzen'; поползти/popolztj is 'to crawl'). Of the four species of nuthatch in the former Soviet Union, only this one is widespread, extending from the Baltic to Kamchatka.

22. ZHAK IN THE DOCK, AGAIN

¹ Honeysuckle *Lonicera altaica*, жимолость (zhimolost').

² Серёра, pronounced Seryoga, is a diminutive (familiar) form of 'Sergey'. Russian employs a vast number of diminutives, sometimes expressing familiarity or affection, sometimes derogatory.

³ Зазноба/zaznoba means 'sweetheart' in colloquial speech.

⁴ Земфира/Zemfira is the heroine in Pushkin's poem 'Цыгане'/Tsygane (The Gypsies).

23. DELIGHTS OF THE SUBARCTIC SUMMER

¹ Monkshood *Aconitum*, борец (borcets).

² Larkspur *Delphinium elatum*, живокость (zhivokost').

³ Раёны *Paeonia anomala*, пеон or пион (peon or pion). Also known in Russian as мари́ньи корень (marin'i koren') or Mary's Root.

⁴ Archangelica *Archangelica decurrens*, дягиль (dyagil').

⁵ Миша/Misha is the affectionate name traditionally given to male bears. Маша/Masha is Mother Bear, Михаил Потапыч/Mikhail Potapych is Father Bear, and Мишутка/Mishutka is Baby Bear. See chapter 25, note 2.

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- ⁶ Rowan or Mountain Ash *Sorbus aucuparia*, рябина (ryabina). See chapter 4, note 9.
- ⁷ Horsetail *Equisetum*, хвощ (khvoshch; хвост/khvost is 'tail').
- ⁸ Shalash: see chapter 6, note 1.
- ⁹ Ча^тушка/chastushka: see chapter 9, note 3.
- ¹⁰ Щи/shchi is a soup usually based on cabbage.
- ¹¹ Meadowsweet *Filipendula ulmaria*, таволга (tavolga). Making infusions from almost any kind of herbs, for medicinal purposes or merely to drink for pleasure, is a popular Russian pastime (and sometimes obsession).
- ¹² Борщ/borshch is a soup, usually made from cabbage and beetroot.
- ¹³ Мочалка/mochalka is a strip of some rough material, sometimes made out of bast (мочало/mochalo), for scraping one's body. See chapter 6, note 16.

24. WE GO FISHING

- ¹ Atlantic Salmon *Salmo salar*, сёмга (pronounced syomga).
- ² Grayling *Thymallus*, хариус (khar^us).
- ³ Minnow *Phoxinus*, гольян (gol'y^un).
- ⁴ Whitefish *Coregonus*, сиг (sig). The Arctic Cisco or Omul *C. autumnalis* is the most delicious fish in the world (VKR).
- ⁵ Olyapoch'i Kamen': see chapter 6, note 10.
- ⁶ Horsetail *Equisetum fluviatile*, речной хвощ (rechny - river; khvoshch - horsetail).
- ⁷ Burdock *Arctium tomentosum*, лопух (lopykh). In colloquial speech it also means 'simpleton'.
- ⁸ Butterbur *Petasites spurius*, белокопытник (belokopytnik; белый/bely - white; копыто/копыто - hoof).
- ⁹ Siberian Whitefish *Coregonus lavaretus pidschian*, сиг-пыжьян (sig-pyzh'y^un). Note that the subspecific Latin name is a transliteration of the Russian, and this is also the case for several other Latin names of fish.

25. A RACE AGAINST TIME

¹ Water Shrew *Neomys fodiens*, кутора (kutōra). Over most of Eurasia except the tundra and north-east Siberia.

² Топтыгин/Топтыгин is Bruin, the bear in *Reynard the Fox*. See chapter 23, note 5. Топтать/топта́т' is 'to trample (down)'.

³ The Russians also use the transliterated English term: кэпче-рикэпче (kepche-rikepche). The method assumes that the proportion of marked individuals in the second catch equals the ratio of the first catch to the total population; various conditions must apply for the method to be valid.

⁴ Tushonka/тушёнка: see chapter 6, note 33.

⁵ Wolf *Canis lupus*, волк (volk). Widespread in Eurasia, from desert to tundra.

⁶ European or Red Fox *Vulpes vulpes*, лисица (lisitsa). Widespread in Eurasia except the far south, and in the north extending to the southern tundra.

⁷ Arctic Fox *Alopex lagopus*, песец (pesets). Tundra.

⁸ Dogs have always been a serious problem, and not only in the far north of Russia. They become feral for various reasons, and some are aggressive and dangerous to both humans and wildlife. The situation may have worsened in the last decade: deteriorating economic conditions in the far north have forced many people to leave the settlements for good, and often the dogs are left behind to survive in the wild as best they can. In some parts of Russia during the 1940s, feral dogs filled the niche left by wolves as the latter were being exterminated as pests (Weiner *Models of Nature*, 1988, p.227).

26. UNLUCKY ZHUZHA

¹ The word бабочка/babochka generally covers all moths and butterflies (ie. Lepidoptera), so from the Russian text the caterpillars could be moths or butterflies. Not to be confused with бабушка/babushka, grandmother, which has been transformed into the English word 'babushka' meaning old woman, granny, or triangular headscarf tied under the chin.

27. HOMEWARD BOUND

¹ An untranslatable play on words. As mentioned in chapter 1, note 1, penochka is 'warbler', but it happens to be similar to пенка/penka = scum, of which penochka could plausibly be a diminutive form. Сливка/slivka is 'cream', and slivochka is a plausible diminutive of it. Сливочный/slivochny is 'creamy'.

² Hooded Crow *Corvus corone cornix*, ворона/vorōna. The Raven *C. corax* is ворон/vorōn. Ворон and ворона were originally masculine and feminine forms of the same noun. Вор/vor is 'thief', and воробей/vorobey is 'sparrow'.

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In Russia the black and grey Hooded Crow *C.c.cornix* extends east to the Yenisey, where there is a hybrid zone with the all-black race *C.c.orientalis* occupying all of Russia east of the Yenisey. The situation is similar to that in Britain, where there is a hybrid zone through the Scottish Highlands, with the all-black race *C.c.corone* to the south and the Hooded Crow to the north.

28. WRITING UP

¹ Although not explained in the Russian text, each card has along the edges a row of holes large enough to allow a knitting needle to be inserted. Suppose that half a dozen cards contain information on a certain topic, which might be given the code '18'. Then those cards will have a nick cut in the card at hole no.18, so the cards fall off when the needle is inserted through the whole stack at that hole. This low-tech method is still useful, despite competition from computers (when the book was written there were very few computers in the Soviet Union).

² Ladybird, *божья коровка* (bozh'ya - God's; korovka - beetle). The phrase also means 'meek or lamb-like creature'.

³ Carabid beetles, *жужелицы* (zhuzhelitsy; жук/zhuk is 'beetle', and жужжать/zhuzhzhāt is 'to humm, buzz, drone' - wonderfully onomatopoeic).

⁴ Spring-tails (Collembola), *ногохвостки* (nogokhvostki; нога/noga is 'leg' and хвост/khvost is 'tail'). An appendage on the end of the abdomen can flick down and propel the insect into the air.

⁵ Aphid or greenfly, *тля/tlya*.

⁶ Biting midge in the family Ceratopogonidae, *мокрец* (mokrets; мокрый/mokry is 'wet', and мокрыша/mokriša is 'woodlouse'). See also chapter 30, note 2.

29. WHY STUDY SMALL BROWN BIRDS?

¹ Tick-borne encephalitis, *клещевой энцефалит* (kleshchevyy, from клещ/kleshch - tick; entsefalit - encephalitis) is a serious disease caused by a virus carried by ticks. The ticks are easily picked up by walking through vegetation, and visitors to the Siberian taiga from Europe should be vaccinated in advance. The Siberian form of the disease (eastern subtype) is far more serious than the European subtype, and can be fatal.

² Sable *Martes zibellina*, *соболь* (sobol') provides one of the most valuable kinds of fur. Siberian taiga.

³ European Bison or Wisent *Bison bonasus*, *зубр* (zubr). Very restricted in range, the main herd being at the Belovezhskaya Pushcha reserve in Belarus and Poland; there are also small numbers in the Caucasus, at Cherga in the Altay, and elsewhere. 'Bison' and 'wisent' are probably cognate.

ONE SEASON

⁴ Polar Bear *Ursus maritimus*, белый медведь (bely - white; medved - bear). The Arctic Ocean and coasts, circumpolar.

⁵ Right Whale *Balaena mysticetus*, гренландский кит (grenlandski - Greenland; kit - whale). Arctic Ocean.

⁶ Red-breasted Goose *Rufibrenta ruficollis*, краснозобая казарка (krasnozobaya - red-breasted; kazarka - goose in the genus *Branla*, or closely related to it). Tundra from western Yamal to eastern Taymyr; it is included in the Russian and international red data books, though now its numbers are recovering.

⁷ Siberian White Crane *Grus leucogeranus*, белый журавль (bely - white; zhuravl' - crane) or стерх (sterkh). Several hundred pairs nest in Yakutia, and several pairs in West Siberia; included in the Russian and international red data books.

⁸ Red Data Book, красная книга (krasnaya - red; kniga - book). The red data book for Russia is Красная книга РСФСР (Krasnaya Kniga RSFSR), Москва: Россельхозиздат, 1983, 456 pages; but there are, or should be, individual red data books for all the constituent parts of the Russian Federation.

⁹ In the 1950s and '60s, one of plant breeder I.V. Michurin's sayings became fashionable: Мы не должны ждать милостей от природы. Взять их у нее - наша задача (We cannot expect favours from nature: it is our duty to take them).

¹⁰ Fruit flies *Drosophila*, дрозофила (drozofila). This group of flies became famous early in the 20th century on account of their suitability for developing the theory of Mendelian genetics.

When Mendelian genetics fell out of favour in the Soviet Union from c.1948 to the early '60s, the flies too became tainted in orthodox eyes, and biologists studying them tended to fall under suspicion.

30. ZOOLOGISTS AND WHAT THEY STUDY

¹ There is no Russian word in general use for 'birder' or 'bird-watcher'. Until recently, and perhaps still, most members of Russian ornithological societies have been professionals working at institutes, universities, or заповедники (zapovedniki - strict nature reserves), and in comparison with many Western countries there are very few amateurs.

One problem at the time of writing (1997) is the shortage and/or expense of field guides and binoculars, making it difficult for an amateur to get started. The Russian equivalents of our 'birder' are орнитолог-любитель (ornitolog - ornithologist; lyubitel' - amateur) and любитель птиц (lyubitel' ptits - bird lover).

² The main groups of biting or otherwise irritating flies are (настоящие) комары (Culicidae, true mosquitoes), (комары-)звонцы (Chironomidae, non-biting midges), мокрецы (Ceratopogonidae, biting midges, including the famous Scottish one; in America known as 'no-see-ums'; see Chapter 28, note 6), слепни or пауты

NOTES

(Tabanidae, clegs and other horse flies), мошки (Simuliidae, black-flies), and оводы (Oestridae, warble/bot/nostil flies).

³ In the Soviet Union young professional people were usually assigned to their first job on qualifying. In this case the young scientist would have had to follow the wishes of her supervisor rather than her own.

⁴ Наталья (Natal'ya) is her first name, and Владимировна (Vladimirovna) her patronymic, her father being Владимир (Vladimir). Наташа (Natasha) is an affectionate form of Наталья, used for young people. The full first name with patronymic is more appropriate for older people.

Russian is particularly rich in diminutives: other forms of Наталья are Ната (Nata), Таша (Tasha), Наташенька (Natashen'ka, an affectionate form), and Наташка (Natashka, a pejorative form).

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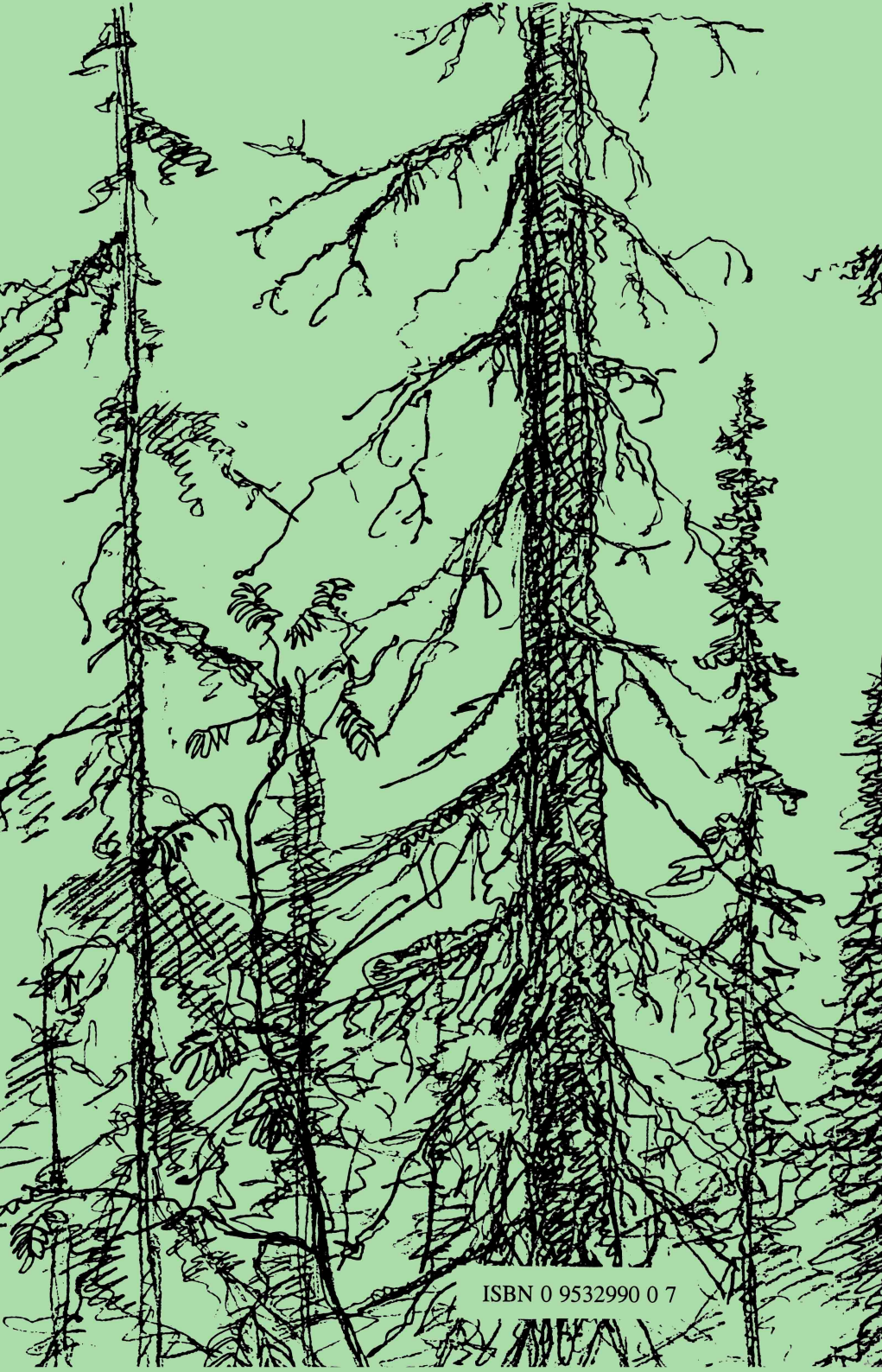
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