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Abstracts

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Chrysomelid beetles in the Subarctic: temperature thresholds, daily rhythm of activity and time budgets

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Three leaf beetle species (*Gonioctena pallidus*, *G. linnaeanus*, *Chrysomela collaris*) were studied in the Low Ob' region (Polar Urals) in 1998–2000, in the first half of July. All of them are common here in tundra and shrubbery sites on different *Salix* species. In laboratory experiments the lower temperature thresholds for growth of the last instar larvae were found to be 4.8°C for *G. pallidus*, 6.0°C for *Ch. collaris* and 9.8°C for *G. linnaeanus*.

Larval behaviour was examined in natural habitat of each species using daily observations. Twenty marked larvae were simultaneously under observation. A kind of activity for each larva (feeding, moving, molting and so on) and its position on a plant were registered at hourly intervals. The common place for *G. pallidus* larvae was shown to be the lower leaf surface; they come to upper surface or to tip shoot leaves only at 5–9 a.m., and at these hours you can see round you thousands of larvae undetectable before. In the day period when basking is possible 70% of larvae avoid sunlight, while 63% of *Ch. collaris* and 83% of *G. linnaeanus* larvae are placed then openly rising their body temperature by means of solar radiation. Dark colouration (in contrast with green *G. pallidus* larvae) helps their basking. The larvae of these two species pass to leaf underside or to inner part of willow bush mainly for "night" period, *Ch. collaris* larvae - also in the hottest hours of the day, and all species seek here a shelter against rain and wind.

Leaf beetle larvae feed when air temperatures exceed threshold ones, be it "day time" or "night time". The feeding intensity of *G. linnaeanus* larvae was the highest in periods when they could feed. They have however the shortest feeding time because of night temperature fall (14.9 hours in a day vs. 22.5 h in *G. pallidus* and 20.4 h in *Ch. collaris*) and it was calculated for 24-hours period that all species spent approximately 30% of their time in feeding. Feeding of *G. linnaeanus* is high and stable in the middle of the day while two other species demonstrate the high morning (7–10 a.m.) peak of feeding activity and somewhat lower evening (16–21 p.m.) peak. Only a small proportion of time (7–10%) is used for moving by these three species. So the large part of the day is free of feeding and moving but this "waste of time" is not connected with necessity of basking.

Time budget of north chrysomelid larvae doesn't depend on their threshold temperatures. Different temperature thresholds of chrysomelid species are however the possible reason of differences in day rhythm of their larval activity. Necessity of basking also is different according to temperature thresholds.