

SOME EFFECTS OF ATMOSPHERIC HUMIDITY ON TWO NYMPHALIDAE: *AGLAIS URTICAE* L. AND *ARASCHNIA LEVANA* L.

By Jean LECLERCQ, F.R.E.S.

(Belgian Fellow of the British Council.)

I HAD the opportunity in June 1943 of breeding a number of caterpillars of *Aglaís urticae* L. and of *Araschnia levana* L. (from eggs of the first generation) and I thought it would be interesting to test the effects of humidity on their pupae, for little is known about the humidity relations of any NYMPHALIDAE.

Caterpillars were bred on nettle, and experiments were carried out in a room at the outdoor shade temperature. Immediately after pupation, pupae were put in glass tubes, hermetically closed, with constant relative humidity controlled by means of supersaturated salts (Buxton, 1931; Zwölfer, 1932, and others).

RESULTS.

(1) *Aglaís urticae* L.

Pupae of this species were found to be very little influenced by atmospheric humidity. Butterflies hatched under all conditions from 7% R.H. to 100% R.H., and no significant mortality was recorded at any percentage. The time for hatching was also eight to nine days under all conditions without any indication of lengthening in moisture or dryness.

However, butterflies obtained in saturated air often remained unable to extend their wings completely. On the other hand, some specimens bred in dry air could not escape completely from their pupae and died in a position of half emergence.

(2) *Araschnia levana* L.

A preliminary note has already been published giving some of my results for this species (Leclercq, 1946). It was shown that its pupae are also resistant to all conditions of humidity, but less resistant than *Aglaís urticae*. Many pupae died at 100% and under 40% R.H.

The duration of development is also affected by atmospheric humidity. Butterflies appeared as follows:—

- At 100% R.H., after an average of 12.4 days.
- At 85 to 79% R.H., after an average of 13.3 days.
- At 55% R.H., after an average of 13.5 days.
- At 45 to 35% R.H., after an average of 13.6 days.
- At 20 to 0% R.H., after an average of 14.7 days.

As with *Aglaís urticae*, it was shown that many butterflies hatched in moist air were never able to extend their wings normally.

An interesting effect of humidity on coloration was recorded for this species, which is well known for its seasonal dimorphism. My pupae were expected to produce butterflies of the form *prorsa* L. darker than the summer form. In fact all the specimens obtained between 79% and 45% R.H. were normal *prorsa* L. But specimens obtained by breeding in very moist air show a tendency to be

darker, the majority of them belonging without doubt to the aberration *obscura* Frühstorfer.

Moreover, butterflies from very dry conditions were much brighter, some of them closely resembling the aberration *intermedia* Stichel.

There is, therefore, definite evidence that humidity can be of importance in the determination of the seasonal dimorphism in this species. Similar results were previously obtained using heat or cold (chiefly Süffert, 1924) and melanistic forms of some Lepidoptera were produced by the influence of humidity on caterpillars (Pictet, 1904, 1905). These experiments, proving definitely that the coloration of butterflies may be affected by atmospheric humidity acting on the pupal stage only, seem to me to be of some original interest.

ACKNOWLEDGMENTS.

My experiments were carried out in the Laboratoire de Physiologie Animale of the University of Liège (Belgium). I wish to thank Prof. Z. M. Bacq for constant help and invaluable advice. My thanks are also due to M. J. Hackray (Verviers) for comment about the colour forms of *Araschnia*.

This paper was written whilst holding a grant of the British Council to study at the London School of Hygiene and Tropical Medicine. I am indebted to Dr. K. Mellanby for suggestions and help in the writing of my manuscript.

BIBLIOGRAPHY.

- BUXTON, P. A., 1931, The measurement and control of atmospheric humidity in relation to entomological problems. *Bull. ent. Res.* **22** : 431.
- LECLERCQ, J., 1946, Influence de l'humidité atmosphérique sur les chrysalides d'*Araschnia levana* L. *Lambillionea* **46** : 27.
- PICTET, A., 1904, Variations des papillons provenant de l'humidité. *Arch. Sci. phys. nat.* **17** : 110.
- PICTET, A., 1905, Influence de l'alimentation et de l'humidité sur la variation des papillons. *Mém. Soc. Phys. Genève* **35** : 45.
- SÜFFERT, F., 1924, Bestimmungsfaktoren des Zeichnungsmusters beim Saisondimorphismus von *Araschnia levana-prorsa*. *Biol. Zbl.* **44** : 173.
- ZWÖLFER, W., 1932, Methoden zur Regulierung von Temperatur und Luftfeuchtigkeit. *Z. angew. Ent.* **19** : 497.