2e Série, Tome 41 Supplément no 1 Année 1969

BULLETIN

DU

MUSÉUM NATIONAL D'HISTOIRE NATURELLE

PARIS

MUSÉUM NATIONAL D'HISTOIRE NATURELLE

57, Rue Cuvier, 5e

Publication bimestrielle

Paru le 15 Mai 1970.

IVe CONGRÈS INTERNATIONAL

D'ARACHNOLOGIE

PARIS 8-13 AVRIL 1968

COMPTES RENDUS

❖

IVth INTERNATIONAL CONGRESS

OF

ARACHNOLOGY

PARIS 8-13 APRIL 1968

PROCEEDINGS

❖

IV. INTERNATIONALER KONGRESS

FÜR

ARACHNOLOGIE

PARIS 8.-13. APRIL 1968

VERHANDLUNGEN

Centre International de Documentation Arachnologique
C. I. D. A.
61, rue de Buffon
PARIS-5e

SOME OBSERVATIONS ON NUTRITION DURING THE LARVAL DEVELOPMENT OF HETEROPODA VENATORIA *L.*

(Eusparassidae, Araneae)

by

Jan ŽDÁREK and Eva ŽDÁRKOVÁ

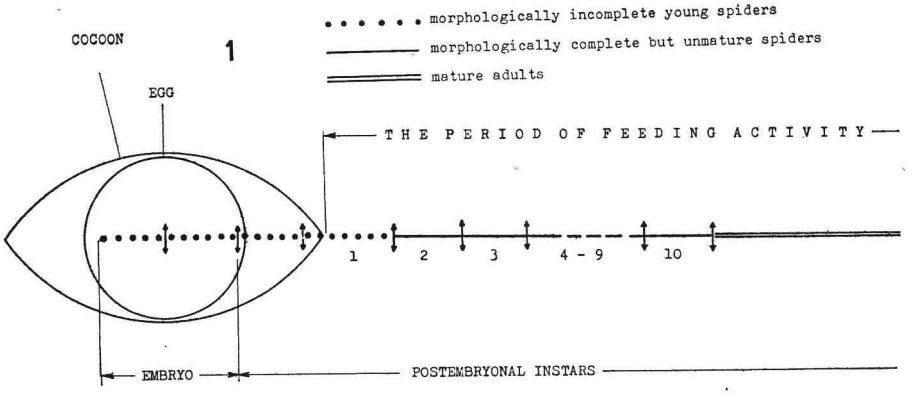
U druhé baterie 6, Praha 6 (Tchécoslovaquie)

The life history and behaviour of the Sparassid spider *Heteropoda venatoria* L. was originally described by BONNET (1932). In the present study the problem of nutrition was investigated in young instars with its influence on the developmental characters such as the duration of the postembryonic development and the total number of larval instars.

The ontogenetic development of the species includes two embryonic, one intracocoonal postembryonic (HOLM, 1940) and a variable number of free larval instars, which develop outside the cocoon, followed by one imaginal instar. The first of this extracocoonal instars is still an incomplete one (fig. 1).

The breeding experiments started with spiders of the first extracocoonal, morphologically incomplete instar leaving the cocoon. The spiders were placed in small jars, a single jar containing one, two, three or four specimens, and kept until their third ecdysis. This arrangement enabled us to observe the occurence of cannibalism during this period. Since the fourth instar the surviving animals were isolated one specimen per jar and the size of the jars was gradually increased to correspond to the size of the developing spiders. The animals were kept in constant temperature of 25 $\pm$ 1°C. The smallest spiders were fed *Drosophila* flies, later *Musca domestica* were offered, whilst the oldest had nymphs of *Gryllullus domesticus* so that the size of the prey corresponded to the size of the given developmental stage. The spiders were provided with an abundance of food during all their development to prevent any undernourishment. The food taken was recorded and its approximate weight was estimated by comparing the size of the eaten insects with that of accurately weighed samples.

The experiment started with 212 specimens of the first extracocoonal instar. Only 32 specimens (16 males and 16 females) completed their larval development between the 9th and 14th larval instars, most of them in 11th and 10th instars (fig. 2). The average was 10,6 in males and 11,4 in females. Since the average length of an instar was approximately the same in both sexes (23,2 days in males, 23,0 in females), the whole life span of the female larvae was on average longer (262 days) than that of the male larvae (248 days). The duration of individual instars is shown at the fig. 3.



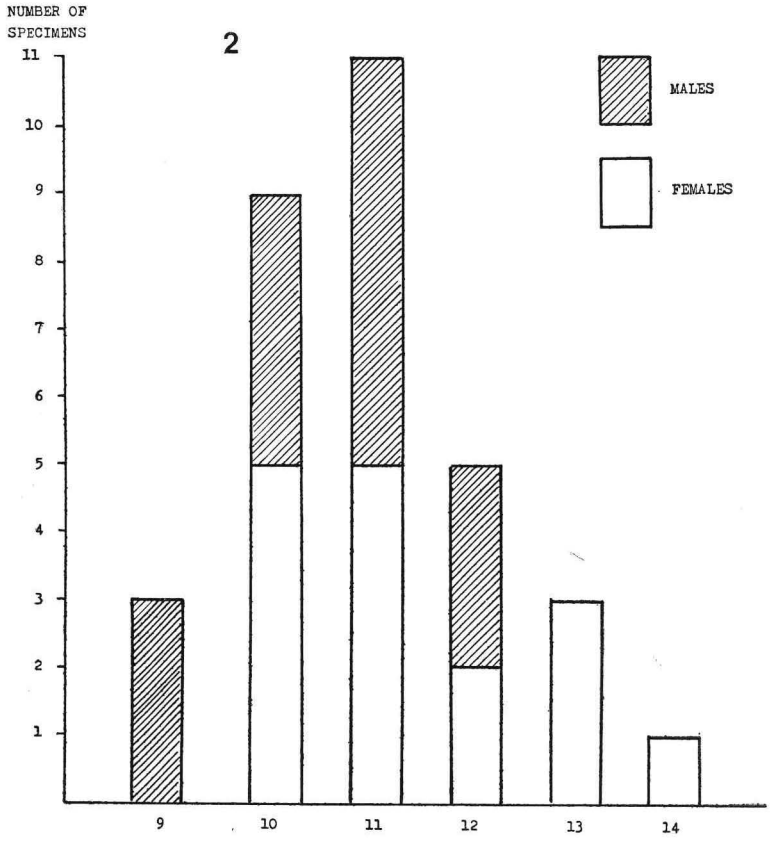
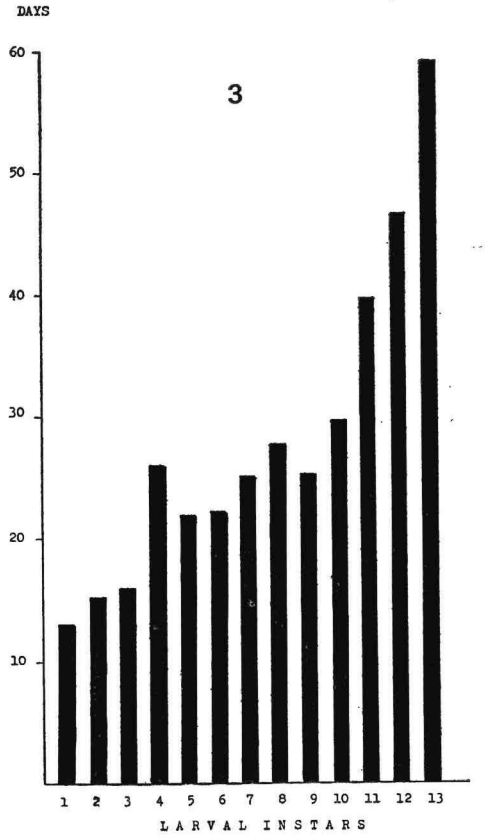


FIG. 1. — Diagram of the ontogenetic development of *H. venatoria*. Arrows indicate moults. Instars are counted from the beginning of the feeding period ; for the sake of simplicity they are referred to as larval instars (Detailed explanation in text).

FIG. 2. — Fluctuations in the number of larval instars in a laboratory stock of *H. venatoria*.



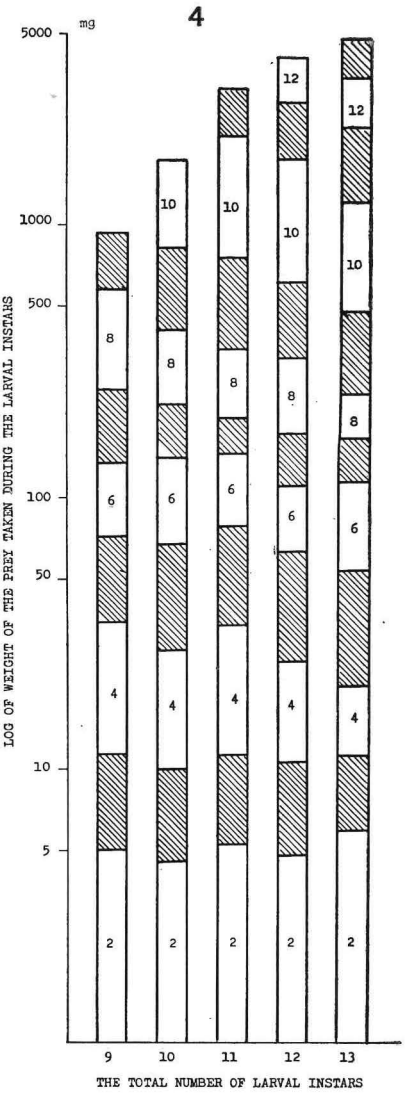


Fig. 3. — Average duration of larval instars of *H. venatoria* at the temperature of 25 ± 1°C.
Fig. 4. — Average weights of the food taken by the specimens which completed their ontogenetic development in different numbers of instars.

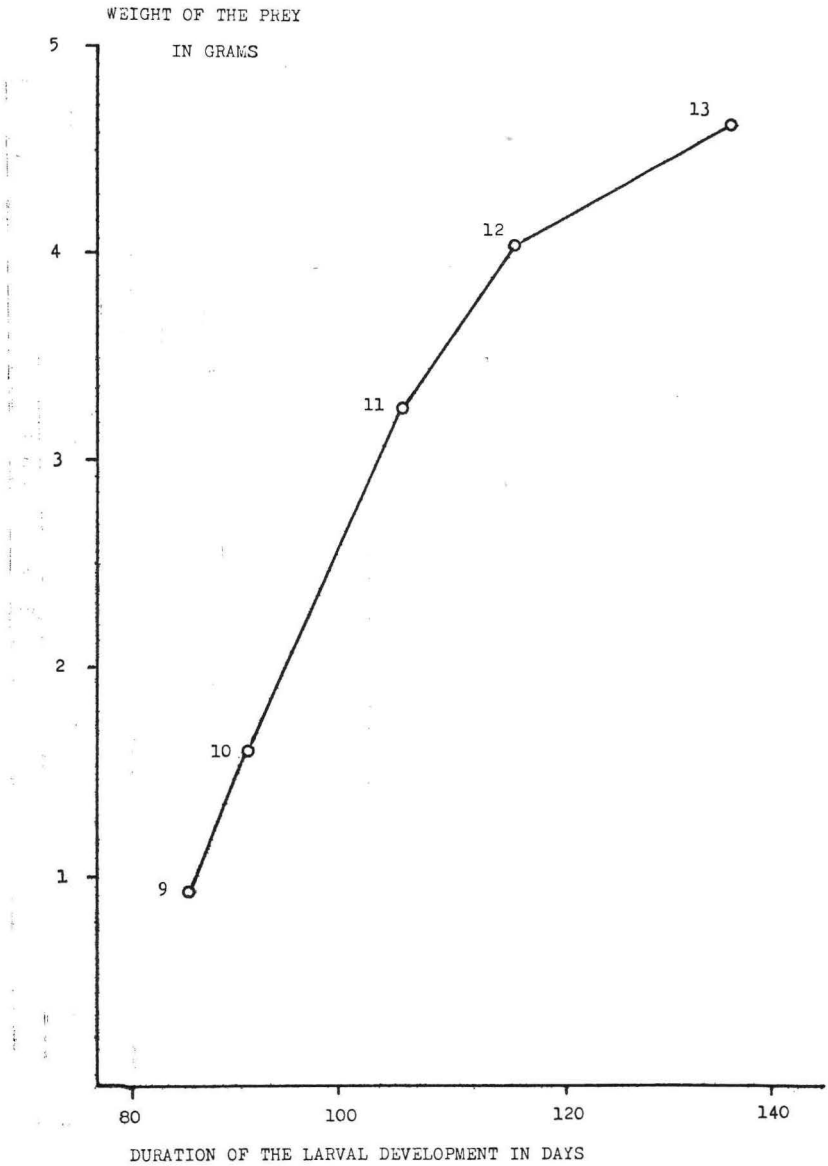


FIG. 5. — Relationship between the total weight of food taken during the larval development and the duration of this development. Circles represent groups of specimens which reached the adult stage after given number of larval instars.

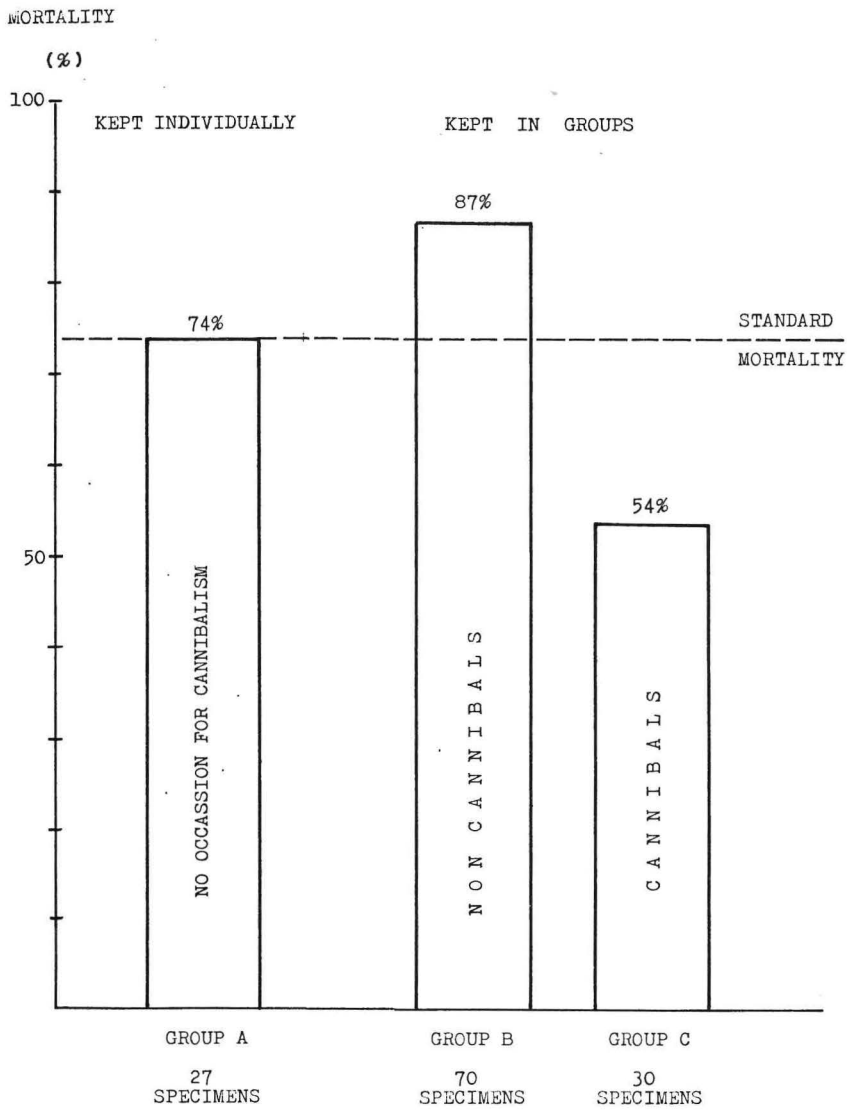


FIG. 6. — Mortality in unmatured specimens kept either individually (A) or in groups (B, C) during the early instars. (Detailed explanation in text).

All the young spiders of the last incomplete instar (i.e. the first one developing outside cocoon) accepted the food. The imperfect morphology, therefore, is not connected with an incomplete function. In other words, the feeding period starts with this incomplete instar. The food was accepted once at least, and often several times, in each subsequent instars with only two exceptions out of several hundred observed. The first half of each instar appeared to be the main feeding period in most cases. The average amount of food taken during the particular instars is given in fig. 4. It is evident that the specimens with a higher number of moults ingested a smaller quantity of food in the given instar than those with a lower number of instars. It is suggested that nutrition might be one of the factors determining the rate of development by influencing the physiological mechanism controlling the moult cycles. Further experimental work is needed to learn the effect of starvation on moulting.

Another question is what kind of relationship exists between the quantity of food and the length of the development. The spiders which have completed their larval development after a higher number of moults ingested relatively less food per unit time (fig. 5). It supports the suggestion mentioned above that nutrition is one of the components of the mechanism controlling the moulting cycle. The food intake seems to accelerate the rate of development. This mechanism might be understood as a phylogenetical adaptation of the animal to periods of shortage of food during the ontogenetical development.

To observe the cannibalism appearing during early instars, some spiders were kept together, the others were isolated as described above. After the third moulting the surviving spiders were then separated. They were distributed in the following three groups :

A. Isolated specimens having had no possibility to prey upon each other (27 specimens).

B. Spiders kept 2 to 4 in one jar having had opportunity for cannibalism, but having not used it (70 specimens).

C. Spiders having eaten 1, 2 or 3 individuals of the same developmental stage (30 specimens) (fig. 6).

Mortality in these three groups was compared. Providing that the value found in the group A (74 per cent) represents a standard mortality of the population (controls), the value found in the group B (87 per cent) and that in the group C (54 per cent) suggest that the cannibalism taking place in early instars can act as a selective developmental factor. On the other hand, no significant differences in the rate of development were found between the individual members of these groups.

REFERENCES

Bonnet, P., 1932. — Cycle vital de *Heteropoda regia*. Livre du Centenaire Soc. ent. Fr., Paris, pp. 497-503.

Holm, A., 1940. — Studien über die Entwicklung und Entwicklungsbiologie der Spinnen. *Zool. Bidrag Uppsala*, **19**, pp. 1-214.

INTERVENTIONS : H. Buchli et M. Vachon.