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CONTRIBUTION TO THE KNOWLEDGE OF THE ARACHNO- AND ENTOMOFAUNA OF DIFFERENT WOOD HABITATS*

PART IV

PHENOLOGY OF THE MOST ABUNDANT STAPHYLINIDAE, PSELAPHIDAE AND CATOPIDAE

by L. BAERT** and J.P. MAELFAIT***

ABSTRACT

The phenology of some Staphylinoidea is discussed. A possible relationship between activity and temperature is made.

INTRODUCTION

In previous parts we gave a theoretical investigation of the pitfall method, a description of the sampled habitats (Maelfait & Baert, 1975) and the general results for the Coleoptera (Baert &Maelfait, 1977). This part will deal with the phenological results of the most caught Staphylinoidea (Staphylinidae, Pselaphidae and Catopidae). We also looked for a possible relationship between temperature and the temporal variation of the captures (the activities).

A. STAPHYLINIDAE

1. *Lathrimaeum atrocephalum* (GYLL.) (fig. 1) : This species is known to be a typical wood habitant, although during winter

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months it is also found is open habitats. Since they show a preference for cool and humid biotops (HEYDEMAN 1956, LINDROTH 1945, THIELE & KOLBE 1962) these open habitats are left again during warmer springtime.

In the macrohabitat we sampled it was found active in both microhabitats (BAERT & MAELFAIT, 1977). The « availability-distributions » in both microhabitats differ slightly from each

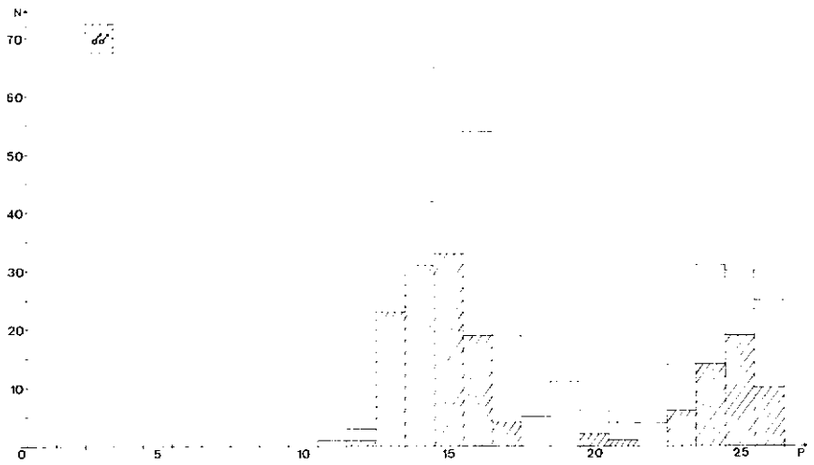

FIG. 1. — Catches in 12 pitfall traps in 1972-1973 of *Lathrimaeum atrocephalum*.

other, although these differences are not significant. The reason for the more regular shape of the « availability-distribution » in the drain can be explained by the preference of these beetles for humid habitats and the presence of a well developed layer of litter. This could be in agreement with the findings of LINDROTH (1945), THIELE (1956), THIELE & KOLBE (1962).

The « availability distribution » consists of two subperiods. The first subperiod occurs in the second half of autumn, the second during the first half of spring ; only females (a few ♂♂) were captured during the winter months. The activity during the first subperiod started only in October, a first maximum activity was reached in the middle of November, and activity stopped by the end of December and the beginning of January. During the

second subperiod the activity started in the second half of March, reached a maximum of activity in the second half of March and the first half of April, and ended about the first half of May.

The relationship between the « availability-distribution » and the mean maximum and minimum air and soil (— 2 cm) temperature for the first subperiod is as follows (the temperatures given are the mean temperatures of the sampled periods) :

	air temp.		*soil (— 2 cm) temp.*	
	mean max.	*mean min.*	*mean max.*	*mean min.*
Start of activity . . .	± 13°C	± 2°C	± 13°C	± 4.5°C
Maximum of activity .	± 8°C	± —2°C	± 6°C	± 0.5°C
End of first subperiod .	± 1.5°C	± —4°C	± 3.5°C	± —2.5°C

Once the air temperature drops beneath 15°C the activity starts. The first subperiod is spread over a period during which the mean air temperature decreases from ± 13°C to ± 1.5°C. Maximum activity is reached approximatively in the middle of this decrease. Little activity occurred during the winter months. When the mean maximum air and soil temperatures increase again to both ca. 6.5°C, we see that once this temperature is exceeded, a second period of activity begins, which reaches a top at ca. 15°C. Above this temperature the activity decreases again to zero.

The males of *L. atrocephalum* are only active during the subperiods described above, while the females were found active during the whole period of activity. The males reached their maximum activity, during the first subperiod, from 27th October till 24th November, the females from 10th November till 8th December. Thus males were active approximatively a fortnight earlier. During the second subperiod the males reached their maximum activity in the first half of April, whereas the females did so in the second half of March i.e. a fortnight earlier.

During the same year R. BOSMANS (1973) found approximatively the same « availability-distribution » in a beech forest (Zwijnaarde), with higher activity-densities however. He found two subperiods that were quantitatively equal.

E. DE CONINCK (1972) found in a typical wood habitat (we only dispose of samples taken during the first subperiod), adjacent

to our macrohabitat, the following « availability-distribution » : the activity started late September — early October, reached a maximum during the second half of November, and ended late December. She found the following temperature relationship :

	air temp.		*soil temp.*	
	mean max.	*mean min.*	*mean max.*	*mean min.*
Start of activity . . .	± 15°C	± 7°C	± 12°C	± 7°C
Maximum activity . .	± 8.5°C	± 3°C	± 7.5°C	± 4°C
End of first activity .	± 9.5°C	± 4°C	± 8°C	± 5°C

The maximum activity of the males was recorded in the first half of November, whereas the one of the females was recorded in the second half of the same month.

We can conclude that *L. atrocephalum* is a species active during the coldest months of the year, showing high activity during autumn and spring, and a little activity during the colder winter months. The activity of this species is certainly determined by both endogenic stimuli (search for a copulation partner) and exogenic « Zeitgeber ». The « Zeitgeber » could in this case be the lowering of the temperature to values approximating 15°C (air temperature).

2. *Syntomium aenum* (MÜLL.) : this species was active during the greater part of the year and showed a high activity in September.

3. *Oxypoda lividipennis* MANNH. (fig. 2) : the activity period of *O. lividipennis* coincides partly with the first activity subperiod of *Lathrimaeum atrocephalum*. The activity of *O. lividipennis* started during the second half of October, reached a maximum late November — early December. The winter months are characterized by a lower activity. A little activity was also recorded during May 1972 (mean max. air temp. ca. 14°C ; mean max. soil temp. ca. 13°C). *O. lividipennis* is mainly a staphylinid active in autumn with little activity during winter months.

It's activity started when the mean maximum air temperature decreased to a value of ca. 10°C (mean max. soil temp. : ca. 11°C), and reached its maximum at a mean maximum air temperature

of ca. 6.5°C (mean max. soil temp. : ca 8°C). The lowering of the mean maximum air temperature to values approximating 10°C can be the exogenic « Zeitgeber » for its activity.

R. BOSMANS (1972) found about the same « availability-distribution » in a beech forest (Zwijnaarde).

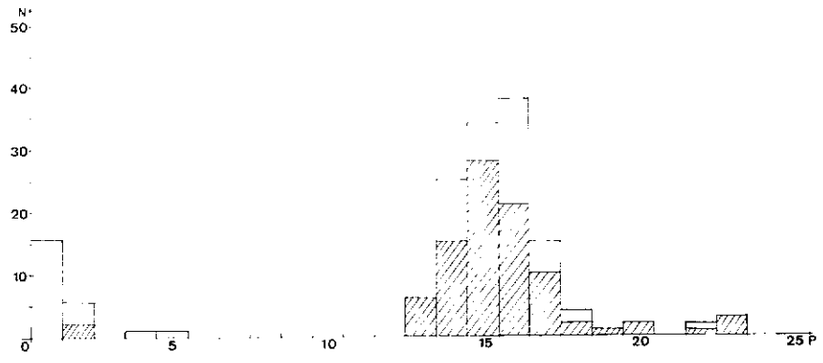

FIG. 2. — Catches in 12 pitfall traps in 1972-1973 of *Oxypoda lividipennis*.

4. *Othius myrmecophilus* KIES. : active during the greater part of the year, with a higher activity during the second half of July, August and September. Although known in the literature as a hygrophyle species, it was caught almost extensively on the dryer ridge.

5. *Micropeplus tesserula* CURT. : is active during May, June, July and August.

6. *Mycetoporus brunneus* (MARSH.) : was found active during the spring and summer months. Was captured in the moister drain only occasionally.

7. *Acidota cruentata* MANNH. : the « availability-distribution » of *A. cruentata* coincides greatly with that of *Oxypoda lividipennis*. Therefore the same considerations about the relationship between activity and ambient air (and soil) temperature apply.

8. *Xantholinus linearis* (OLIV.) : was found active from late November until late March. Consequently it is a species active during late autumn-early winter. Most of them were caught on

the ridge. This coincides with the findings of VAN DER DRIFT (1951) (Veluwe ; oak-mull and oak-mor). We found an activity between October and May, with a maximum in the first half of May.

B. PSELAPHIDAE

1. *Brachygluta fossulata* (REICHB.) : is active during the greater part of the year, with two periods of higher activity, the first one in April and May, the second one during the second half of July and the first half of August. The first activity top is reached during the first half of May, the second one late July.

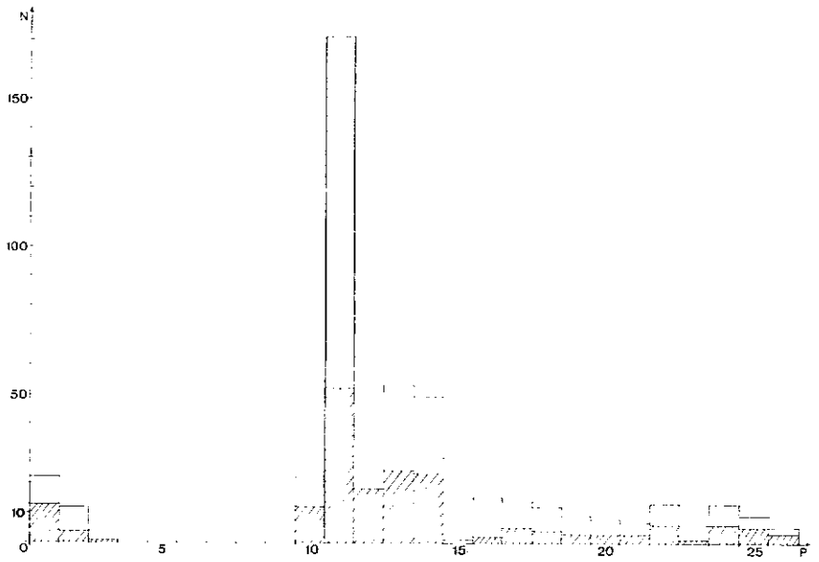

FIG. 3. — Catches in 12 pitfall traps in 1972-1973 of *Nargus wilkini*.

C. CATOPIDAE

1. *Nargus wilkini* (SPENCE) (fig. 3) : is known to be a typical habitant of wood habitats. It was found active from September till May ; a higher activity was noticed in September, October and the first half of November. The activity during this period starts begin September, reaches a peak during the second

half of September and ends in the beginning of November. The female and male activity-peaks coincide with the activity peak of the species. Females were caught much more frequently than males (ratio ♀♀ to ♂♂ : 1.6).

The relationship bitween the high-activity period and the mean maximum and minimum air and soil (— 2 cm) temperature is as follows :

	air temp.		*soil temp.*	
	mean max.	*mean min.*	*mean max.*	*mean min.*
Start of activity . . .	14.5°C	6°C	15°C	9°C
Activity peak	14.5°C	2.5°C	14°C	5°C
End of high-activity period (24/XI) . .	8.5°C	1.5°C	9.5°C	4°C

BOSMANS (1973) found in a beech-forest (Zwijnaarde) *N. wilkini* to be active during the same period as we did, but which an activity peak early November, i.e. 3 sample periods later.

DE CONINCK (1972) found that in a typical wood habitat, adjacent to our macrohabitat a peak activity occurred mid-October. She found the following temperature relationship.

	air temp.		*soil (— 2 cm) temp.*	
	mean max.	*mean min.*	*mean max.*	*mean min.*
Start of activity . . .	18.5°C	8°C	17°C	8°C
Activity-peak	15.5°C	2.5°C	13°C	5.5°C

In general we can conclude that *N. wilkini* is a species highly active during the last month of summer and the first month of autumn. The exogenic « Zeitgeber » stimulus for the start of its activity could be the lowering of the mean air (and soil) temperature to values approximating 19-14°C.

2. *Nargus velox* (SPENCE) (fig. 4) : this beetle is also a typical wood habitant. The « availability-distribution » we found for this species coincides with that of *N. wilkini,* except for the lower activity-densities of *N. velox*. Because the pitfall catches

TABLE 1. — *The most caught species*

PERIODS	1 30/4 12/5	2 12/5 26/5	3 26/5 9/6	4 9/6 23/6	5 23/6 7/7	6 7/7 20/7	7 20/7 4/8	8 4/8 18/8	9 18/8 1/9	10 1/9 15/9	11 15/9 29/9	12 29/9 13/10	13 13/10 27/10	14 27/10 10/11	15 10/11 24/11	16 24/11 8/12	17 8/12 22/12	18 22/12 5/1	19 5/1 18/1	20 18/1 1/2	21 1/2 15/2	22 15/2 2/3	23 2/3 16/3	24 16/3 29/3	25 29/3 13/4	26 13/4 26/4
Lathrimaeum atrocephalum																										
♂♂												1	23	31	33	19	4			2	1		6	14	19	10
♀♀											1	2	15	11	32	35	15	5	11	4	3	4	8	17	11	15
Tot.											1	3	38	42	65	54	19	5	11	6	4	4	14	31	30	25
Syntomium aeneum	12	8	5	6	1		9	9	11	22	37	9	8	12	4	3	6	1	6	4	10	10	7	8	4	12
Oxypoda lividipennis																										
♂♂		2											6	15	28	21	10	2	1	2		1	3			
♀♀	8	1		1	1									10	6	17	5	2				1				
Tot.	8	3		1	1								6	25	34	38	15	4	1	2		2	3			
Othius myrmecophilus	4	1	3	2			15	14	15	10	7	4	5	2		1		3	1	1			1		1	1
Micropeplus tesserula	2	3	12	9	10	3	6	1															1			1
Mycetoporus brunneus	4	2	2	3	16	9	14	3	1	1	1		1	1		1									1	
Acidota cruentata														9	19	23	18	4	3	8	4		1	1		
Xantholinus linearis	1														1	2	3	2	4	6	3	2	1	1		
Brachygluta fossulata	67	38	9	3	6	3	14	12	7	7	7	1	3		2	2	5			1	2	1	1	2	8	27
Nargus wilkini																										
♀♀	13	4	1							12	52	18	24	23		2	5	4	3	3	3	6	1	6	5	3
♂♂	9	8	0							10	119	35	29	23	1	13	9	8	6	5	4	7	5	7	4	2
Tot.	22	12	1							22	171	53	53	49	1	15	14	12	9	8	7	13	6	13	9	5
Nargus velox																										
♀♀	1	1	1				1			2	65	43	25	20	3	7	6	2	1	1	1	1		1		
♂♂	3	2		1						2	50	24	12	8	1	12	5	3	2	8	4	5	1	5	1	
Tot.	4	3	1	1			1			4	115	67	37	28	4	19	11	5	3	9	5	6	1	6	1	
Mean temperatures (C°)																										
air temp. max.	14	19		20.5	19.5	24.5	20	19.5	21.5	14.5	14.5	11.5	10	8.5	8.5	6.5	2.5	1.5	4	5.5	6.5	8.5	11.5	16	13	
air temp. min.	4.5	8		8.5	9	12.5	10	10	8	6	2.5	1.5	2	1.5	—2	—1.5	—6	—4	—2	0	—1	—2.5	—4	—2	0.5	
soil temp. max.	13	17		19.5	19	23	18.5	18.5	26	15	14	12.5	11	9.5	6	8	4	3.5	5	7	6.5	7.5	11.5	16	16	
soil temp. min.	7	9.5		10	10.5	14.5	12	12.5	10.5	9	5	4	4.5	4	—0.5	2.5	—4	—2.5	—0.5	1.5	0.5	0.5	0	1.5	2.5	

between 15/IX and 29/IX are only fragmentary, we cannot locate the peak activity period with certainly.

As regards the relationship between temperature and the high-activity period, the same considerations apply to both species.

The female and male activity-peaks coincide fully with the activity-peak of the species (ratio ♂♂ to ♀♀ : 1.2). In 1972 De Coninck also found, in an adjacent woodplat, higher male catch densities.

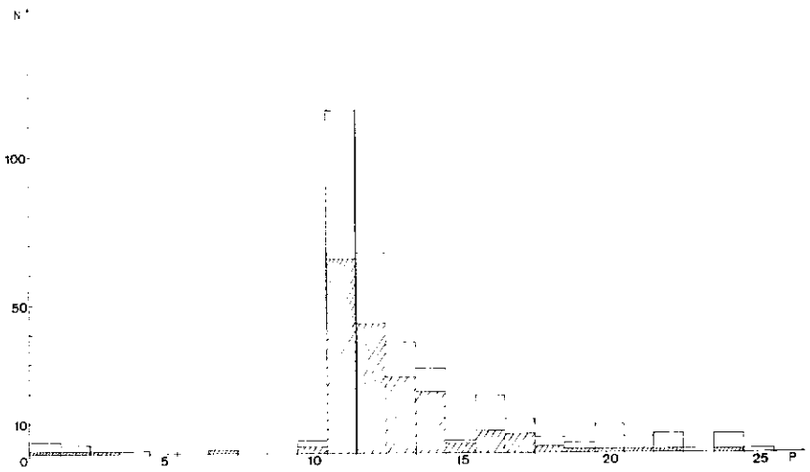

Fig. 4. — Catches in 12 pitfall traps in 1972-1973 of *Nargus velox*.

Bosmans (1973) found the same trend of « availability- distrimution » except for the higher abundances at Zwijnaarde. The temperatures recorded in this macrohabitat were approximately the same as those we recorded at Gontrode.

Bleys found in a coppiced woodland at Zwijnaarde an « availability-distribution » starting during the second half of September and ending during the second half of December, with a peak in the first half of October (one sample period later than in our findings). She found the following temperature-high-activity period relationship :

	mean max. air temp.	*mean max. soil (— 2 cm) temp.*
End of high-activity period (22/XII) . .	17.5°C	15°C
Start of activity . . .	16.5°C	14.5°C
Peak activity	7.5°C	6°C

De Coninck (1972) found the same « availability-distribution » as Bleys (1970) did. She found the following relationship :

	air temp.		*soil (— 2 cm) temp.*	
	mean max.	*mean min.*	*mean max.*	*mean min.*
Start of activity . . .	18.5°C	8°C	17°C	8°C
Peak activity	19°C	10.5°C	17°C	10.5°C

Like *N. wilkini, N. velox* shows a high activity during the last month of summer and the first month of autumn. The exogenic « Zeitgeber » stimulus fort he start of its activity could also be the lowering of the mean air (and soil) temperature to values approximating 19-14°C.

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LE THORAX DES PROTERHINIDES (COLEOPTERA)*

par J. BARLET**

La systématique des Coléoptères est l'une des plus malaisées. Certaines petites familles aberrantes trouvent difficilement leur place dans la classification de cet ordre. C'est par exemple le cas des Aglycydérides et des Proterhinides (ou Proterrhinides de certains auteurs), à la connaissance desquels j'ai désiré apporter une petite contribution nouvelle.

FORBES (1926) dans son travail sur les ailes, les classe à la fin des Phytophages, après les familles constituant le groupe des Curculionoïdes, mais ceci avec doute : les Proterrhinides sont aptères (p. 126) et il n'a pu étudier les Aglycydérides. Pour PAULIAN (1949), ces deux familles constituent les Aglycyderaria, 8e section des Cucujoïdea, juste avant les Coccinellaria. Tenant compte de divers caractères, notamment de leurs tarses trimères, CROWSON (1955, 1967) ne voit aucune raison de séparer les deux familles (1967, p. 162) et ne conserve que celle des Proterhinidae située par lui — comme dans le Traité de IMMS (1957) — dans les Curculionoïdea, après les Anthribides et juste avant les Attélabides.

Après l'étude de base de CARPENTIER (1929), sur la propleure des Coléoptères, la connaissance plus approfondie de celle-ci s'est révélée utile aux systématiciens et phylogénistes (CROWSON, 1967, HLAVAC, 1972). Il en est de même de la connaissance des endosquelettes (ou endosternites) thoraciques qui furent d'une aide précieuse pour CROWSON. C'est pourquoi j'ai examiné des Proterhinides (1) en centrant mon attention sur ces deux sortes de caractères morphologiques et en les comparant à ceux de groupes

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(1) J'exprime ma gratitude à la Smithsonian Institution qui m'a envoyé quelques spécimens de différentes espèces.