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NORSK ENTOMOLOGISK FORENING

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Laboratory Experiments on the Biology of *Syrphus corollae* (Fabr.) (Dipt., Syrphidae)

ELINE BENESTAD

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Morphological differences between the three larval instars are shown. Data on copulation, oviposition and fecundity of *Syrphus corollae* (Fabr.) are given. Mortality, hatching per cent of eggs and time of development of immature stages were tested at 28° C, 18° C, 8-28° C and 6 ° C. Continuously fluctuating temperatures (8-28° C) had a slightly different effect on development of eggs and pupae than the mean, constant temperature (18° C). Males had slightly shorter pupal stage than females at all temperatures. Light had little influence on time of development at 28° C. Early egg- and larval stages tolerated at least 3-4 days at 0° C, the subsequent hatching and development being normal. The abdominal pattern of adults depended on the temperature during development.

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Aphidophagous syrphids have been the subject of various investigations, especially during the last twenty years. Such research has been motivated by the role of the larvae as predators on aphids, which may cause considerable damage to plants. Schneider (1969) gives a survey of our knowledge (bionomics and physiology) of aphidophagous syrphids.

Syrphus corollae (Fabr.) has a holartic distribution (Malski 1959). Laboratory experiments with this species have been carried out especially by Barlow (1961), Bombosch (1962a, 1962b), Wilkening (1961), Volk (1964), Peschken (1965) and Wahbi (1967). In all these experiments constant temperature is used, most frequently between 15° C and 25° C.

The biology of *S. corollae* has not previously been investigated in Norway or under conditions representative of our climate. This paper deals with such experiments, using continuously fluctuating temperature (8-28° C), based on microclimatic measurements in the vegetation at Vollebekk, Ås, near Oslo (Sundby, unpublished). In addition, studies at 18° C and at more extreme temperatures have been carried out.

MATERIAL AND METHODS

Adult flies were captured outdoors during July to September 1967 and 1968 at Vollebekk, Ås, and transferred to 3/4 l glass jars. The tops were covered with cloth gauze and the bottoms with moistened filter paper. For their survival and growth of gonads, imagines need carbohydrates and pollen. Thus honey was given through the cloth top of the jar and from a cotton plug dipped in honey-solution. Pollen from dog-gowans *(Matricaria indora)* was also supplied. Aphids and aphid-excretions constitute stimuli necessary to the female for oviposition. A leaf infested with laboratory reared *Myzus persicae* from swedes *(Brassica napus napobrassica* (L.) Rchb.) served this purpose, giving the female a constant stimulus to lay eggs. The contents of the glass jars were checked at about the same time every day, the eggs removed, and flowers, leaves and honey renewed if necessary. Adults emerging in the laboratory were transferred to a big cage (30 × 50 × 36 cm) at room temperature, where mating occurred after some days. Each copulating pair was isolated and transferred

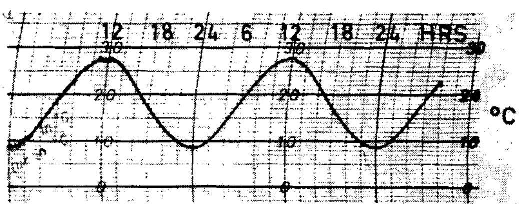

Fig. 1. Fluctuation of the temperature in the 8-28° C incubator.

to the above-described jars. Most of the jars were placed in incubators.

Eggs were kept in moistened petri-dishes, larvae and pupae separately in dram vials, except the pupae at 6° C which developed in petri-dishes.

Incubators with 0° C, 6° C, 18° C, 8-28° C and 28° C and 40-80 % r.h. and a refrigerator at 4° C were used. The photo period was 16-18 hours, but no light was admitted at 6° C, 4° C and 0° C.

The fluctuating temperature condition is shown in Fig. 1. The fluctuating temperature changed continuously from 8° C to 28° C and back to 8° C during 24 hours.

Larvae making up a series were usually obtained from eggs laid on the same day by one female and hatched on the same day. As there was a surplus af aphids, lack of food did not restrict development of the larvae.

In the statistical treatment differences are designated as significant if $P \leqslant 0.05$. Otherwise the P-value is given.

DESCRIPTION OF LARVA

Scott (1939) describes egg-larva, larva and pupa of *S. corollae*. Descriptions of the larvae are also given by Dixon (1960) and Dusek (1967). Here, however, only the third larval instar is considered, and some further information is given below.

First larval instar. Length about 2-3.5 mm. Distinguished from the next two instars by size and by possession of rather long, black hairs at the dorsum. Posterior spiracles separated.

Second larval instar. Length about 3.5-8 mm. Black hairs replaced by stouter, light spines. Distinguished from third instar by size and by separated posterior spiracles.

Third larval instar. Length about 8-11 mm. Spines as in second instar. Contiguous posterior spiracles.

RESULTS

Copulation

S. corollae copulates on the ground. Some flies were found to copulate without intermission for more than two hours, and usually each copulation lasted more than one hour. The flies (n = 19) copulated several times over a period of 2-16 days, and 10 times during 14 days was the maximum observed for one couple.

On average the flies (n=14) copulated 4-5 days after emergence when exposed to normal temperatures (18°C, 8-28° C and room temp.). However, copulation could sometimes be observed on the day of emergence. In the above-mentioned conditions, the females laid their first eggs 5 days or later after emerging, the average being on the 9th day (n=14). Thus a period of three to six days without oviposition succeeded first copulation.

Fecundity

The total number of eggs laid by one female showed great individual variation, — from 0 to 1021 eggs. In the present study no distinct differences were found between oviposition at 28° C, 18° C and 8-28° C. The average fecundity at these temperatures was 436 eggs.

The longest oviposition period for one female was 29 days, but this period was also subject to considerable variation (average 18 days, n=9). The flies usually lived 10-40 days, the average being 27 days (n=9). Most of the females laid eggs almost to the day they died.

In Fig. 2a-c the number of eggs laid daily by three different females is plotted (solid lines). In Fig. 2d these three curves are adjusted so that the days with maximal egg production coincide. The figure reveals considerable variation in the daily egg production of one female — from 0 to 127 eggs. Further, Fig. 2d indicates an oscillating pattern with two more or less distinct peaks, separated by about eight days and with a few days of minimal production between. After three weeks no distinct pattern was found.

Hatching per cent of eggs

The hatching per cent, here defined as the per cent of eggs hatching from those laid, fertilized or not, is given at different temperatures in Table I.

The eggs seem to tolerate rather extreme temperatures. At 6° C they hatched to a higher per cent than the greater part of those from the same female hatching at normal temperatures. This suggests that 6° C does not reduce the hatching ability.

The stippled lines in Fig. 2a-c illustrate the hatching of all eggs from three females. Through the entire oviposition period, or most of it, the female was kept single, copulation thus being excluded. Copulation occurred before the day indicated by an arrow in Fig. 2.

The hatching percentage of eggs laid by one female on different days was not constant. It could change from 100 % to 0 % from one day to the next, but usually differences were less than 30 % in a period of several weeks (Fig. 2a-c).

Time of development

Influence of temperature

The average duration of egg, larval and pupal stages at different temperatures is given in Table II. In addition a few observations were made at 10° C, indicating a duration of larval and pupal development of about 18 days (n=2) and 20 days (n=5) respectively.

Table II shows that development may be

Table I. Effect of temperature on hatching per cent of *S. corollae* eggs

Temp. °C	n	Hatching per cent
8-28	4222	72.1
18	1015	67.3
28	627	67.6
6	46	89.1

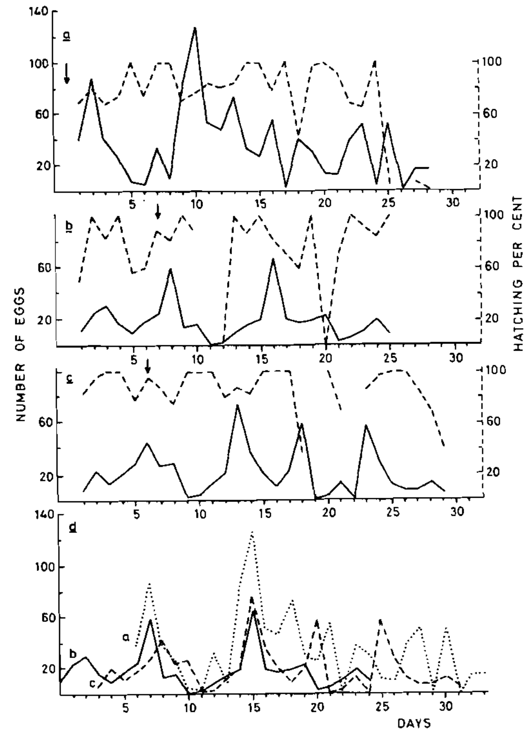

Fig. 2. Oviposition and hatching of eggs of *S. corollae*. a-c: Daily egg production (——) of three females and hatching per cent of these eggs (- - -) at 8-28° C (a and b) and 18° C (c). No copulation occurred after the date marked by an arrow. d: The oviposition curves in a-c adjusted so that the day of maximal egg production of each female coincide.

completed at temperatures at least between 6° C and 28° C. At 4° C the larvae did not develop but survived for nearly two months. Thus the minimum temperature allowing larval development lies between 4° C and 6° C in darkness. Eggs and pupae were not tested at 4° C. Adults emerging at 6° C lived at least one month at normal temperature (16° C). Larval and pupal mortality at 6° C was 30 and 20 per cent respectively.

Table II shows clearly that duration of development is dependent on temperature. Time of development at 28° C and 6° C was significantly different at all stages from the values obtained at 18° C and 8-28° C.

In Fig. 3, duration of each larval instar, the total larval stage and the pupal stage are plotted against temperature. At 10° C, values of

Table II. Average time of development (t) in days of immature stages of S. *corollae* at different temperatures

Temp. °C	Photoperiod	Egg			Larva			Pupa		
		n	t	S.D.	n	t	S.D.	n	t	S.D.
28	18 hrs light	430	1.3	± 0.5	30	7.0	± 0.6	21	5.8	± 0.5
18	18 hrs light	475	3.1	± 0.5	31	10.0	± 0.5	20	10.1	± 0.6
8–28	16–18 hrs light	2639	2.9	± 0.7	117	11.3	± 1.0	83	10.5	± 1.0
6	No light	43	20.0	± 0.0	21	52.9	± 1.3	15	80.7	± 3.3
4	No light	–	–	–	No larval development			–	–	–

the three instars are not available, but would probably be lower than indicated in the Figure, making the sum about 18 days (= total larval stage at 10° C). The speed of development increases exponentially with temperature. Thus the duration of the larval stage is increased by about one month and the pupal stage by two months when temperature drops from 10° C to 6° C.

Although time of development of larvae is strongly dependent on the temperature, the

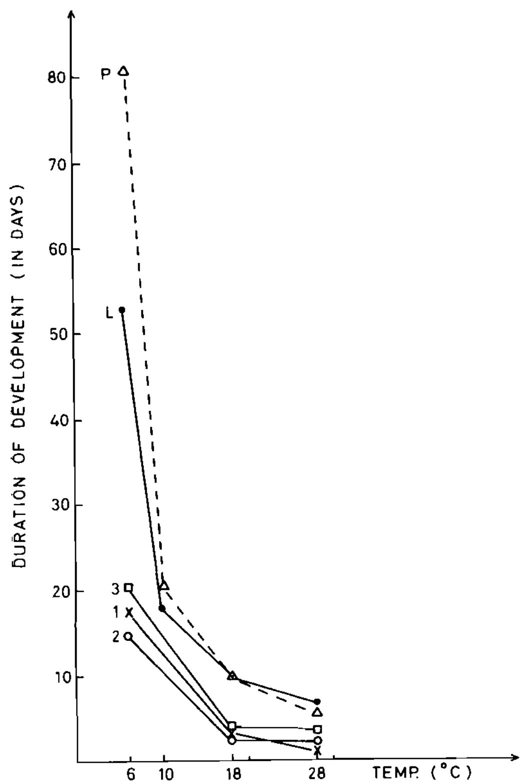

Fig. 3. Duration of each larval stage (1-3), the total larval period (L) and the pupal stage (P) of *S. corollae* at different temperatures.

relative duration of each instar in relation to the total larval stage is fairly constant. This is demonstrated in Table III.

The ratios at 18° C and 6° C are very close and can possibly be used to estimate roughly the duration of each larval instar at temperatures between 18° C and 6° C when total larval development is known, and vice versa.

Fig. 4 illustrates in more detail larval and pupal development at 8-28° C, treating six series separately. The first four series represent 1st-4th generation, each derived from the preceding one. In one of the pupal series no emergence of adults occurred. Standard deviation for each series and average duration of larval stage (given in Table II) are indicated.

The larvae moult for the first time after 3-4 days at 8-28° C. The second moult occurs 2-3 days later. The last instar lasts 4-6 days. Total larval development takes 10-12 days, pupal development 10-11 days. Thus freshly hatched larvae become adults in 21-23 days, and total development from eggs takes 24-25 days at 8-28° C. Pupal stage seems more constant than larval stage. A significant difference was often found in the average developmental time between larvae and between pupae from the various series and generations at 8-28° C.

There seemed to be no connection between the duration of larval and pupal stages or be-

Table III. Relative duration of 1st, 2nd and 3rd larval instar of *S. corollae* at different temperatures. Total larval stage = 1

Temp. °C	n	1st	2nd	3rd
28	30	0.14	0.33	0.53
18	31	0.34	0.25	0.41
8–28	117	0.31	0.22	0.47
6	21	0.34	0.28	0.38

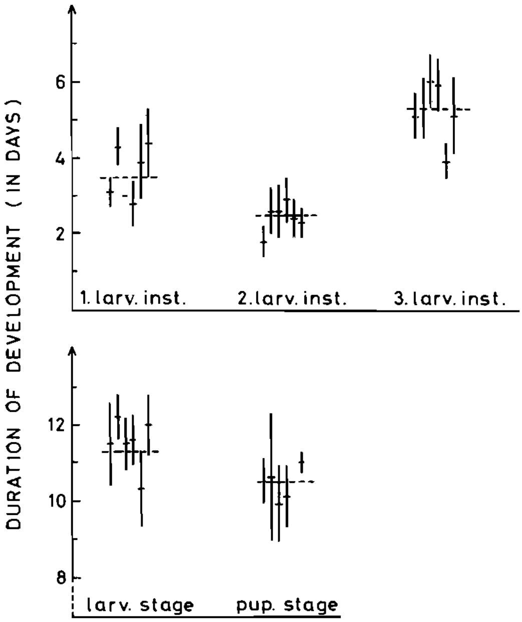

Fig. 4. Average duration of larval and pupal development of *S. corollae* at 8-28° C, illustrated for six series. Standard deviation for each series (vertical lines) and the weighted average duration for all series (dotted lines) are indicated.

tween the duration of each larval instar. Nor is there any clear dependence between generation number and time of development. However, larvae of the first generation developed significantly more quickly than those of the other generations.

Table IV shows variation in the egg-development at 18° C and 8-28°C. At 18° C, 82.5 per cent of the eggs hatched after 3 days, and 65.2 per cent at 8-28° C. Some eggs were 5-6 days old when they hatched.

The differences in Table II between 18° C and 8-28° C are significant at all stages. However, if only larvae derived from the same female as those at 18° C were used, larval development at 8-28° C lasted 10.3 days. In this case no differences in larval development existed between the two temperatures (P=0.5). Similar comparisons at pupal stage confirmed the different effects of 18° C and 8-28° C found in the table.

Table IV. Duration of egg development at 18°C and 8-28°C of *S. corollae*. n = number of eggs hatching

Duration of egg-stage (days)	18°C		8–28°C	
	n	%	n	%
2	29	6.1	516	19.6
3	392	82.5	1721	65.2
4	48	10.1	333	12.6
5	6	1.3	60	2.3
6			9	0.3
Total	475	100	2639	100

Without regard to the material used at 8-28° C, a slight tendency toward slower total development than at 18° C can be seen. However, the differences are small. No differences in mortality between series at 8-28° C and 18° C were found when larvae and pupae from the same female were compared.

Differences in time of development between ♀ and ♂

There are slight differences between time of development of the two sexes (Table V). At larval stage these differences are not significant at any temperature. However, females had a significantly longer pupal stage than males at 8-28° C and 28° C. In all series at other temperatures too, males always used a shorter time for pupal development than females, though the difference was not always significant, perhaps due to the size of the material.

Table V. Average time of development in days of larvae and pupae of *S. corollae* in the two sexes at different temperatures

Temp. °C	Larva			Pupa		
	n	♀	♂	n	♀	♂
8–28	117	11.5	11.2	83	10.7	10.1
28	58	6.6	6.8	49	6.0	5.6
18	31	10.1	9.9	20	10.3	9.9
6	21	53.4	49.3	15	81.6	80.0

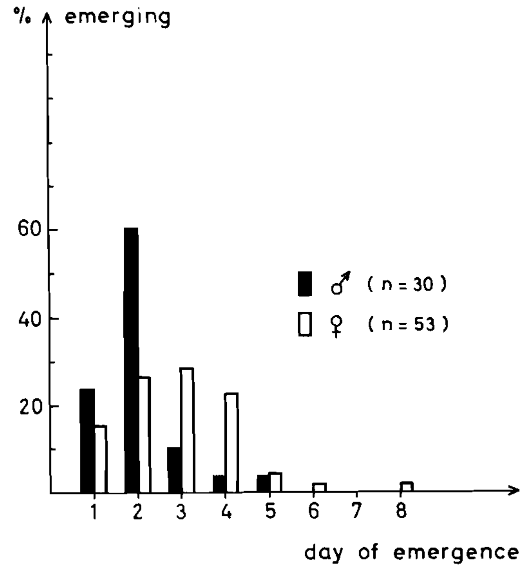

Fig. 5. Proportion (in per cent) of males and females of *S. corollae* emerging each day at 8-28° C.

Fig. 5 confirms the above statement, illustrating the proportion of females and males emerging each day at 8-28° C. The males emerged over a period of 5 days, most of them (60 %) the second day after first-emerging individuals. The females' emergence was even less concentrated, the emerging period being 8 days.

The sex-ratio, accounting all emerging adults from all series and temperatures, was ♀/♂ = 119/90.

Influence of light

Two parallel series at 28° C, one at 18 hrs. light and the other in total darkness, were conducted to see if light had any influence on time of development. Both series originated from the same female. The results are given in Table VI.

The faster larval development in darkness was significantly different from that in light. The duration of pupal stage seemed independent of light. Thus, constant darkness does not retard development at 28° C. In the light series, 46.4 per cent died as larvae and 16.1 per cent as pupae. In the dark series only one larva died.

Influence of a cooling period

Freshly laid eggs tolerated a cooling period at 0° C of at least three days with normal subsequent hatching (81.5 %, n=65) and development at 8-28° C (3.0 days after cooling ceased, n=53). Eggs from the same female served as controls.

The hatching percentage of eggs exposed 1.5 days at 4° C plus 5 days at 0°C was apparently lowered (47.5 %, n=120), but time of development at 8-28° C after cooling ceased was normal (2.6 days, n=120, control 2.5 days, n=38).

When freshly hatched larvae were kept at 0°C for 2 days the subsequent rate of larval development at 8-28°C was normal (10.1 days, n=21, control 10.3 days, n=20). Only one of these larvae died at 8-28° C. Freshly hatched larvae exposed to 0° C for 4 days also developed in about normal time afterwards.

Progeny

Using the data from fecundity, hatching percentage of eggs (Table I), mortality and sex-ratio, the progeny of one female at 8-28° C

Table VI. Average time of development in days (t) of larvae and pupae of *S. corollae* in light (18 hrs) and darkness at 28°C

	Darkness			Light		
	n	t	S.D.	n	t	S.D.
1st larval instar	20	1.7	± 0.5	12	1.3	± 0.4
2nd larval instar	17	1.3	± 0.5	11	1.8	± 0.4
3rd larval instar	21	3.4	± 0.5	11	3.9	± 0.8
Tot. larval stage	21	6.4	± 0.6	12	7.0	± 0.8
Pupal stage	15	5.8	± 0.4	10	5.7	± 0.5

in the laboratory can be estimated to 122 females and 94 males.

Influence of temperature on abdominal colouration

Usually the yellow spots on third and fourth abdominal segments of adult *S. corollae* are joined at the middle in males and separated in females. Adults captured in the field and also those emerging at 8-28° C and 18° C all had this pattern.

However, these abdominal spots were joined at the middle in all females emerging at 28° C. At this temperature all males emerging had broader spots than those captured outside or emerging at normalt temperatures.

All males emerging at 10° C and 6° C had separated abdominal spots. At these temperatures the females had more narrow spots than usual. When larvae developed at 18° C and pupae at 10°C, the males that emerged had separated spots.

It thus seems that the visible amount of yellow pigment increases with the temperature and is determined at the pupal stage. Factors dependent on temperature could possibly also be of importance in the pigmentation of the flies.

The consistency in abdominal pattern found between flies from the field and those emerging at 18° C and 8-28° C agrees with the assumption that these temperature conditions are representative of our field climate.

DISCUSSION

The duration of each copulation was found to be highly variable. Data from Wilkening (1961) support this result, showing a maximum duration of at least eight hours. Also the number of copulations carried out by each fly varied greatly. Wilkening (1961) found that a single copulation is sufficient for some females to fertilize all or a great part of their eggs. The longevity of the sperms is also confirmed by the present observations. A female could lay fertilized eggs at least 25 days after a copulation. This is probably of importance to the species in years with low population density and reduced contact between the sexes.

Wilkening (1961) characterizes copulation on the day of emergence as rare, while Bombosch (1957) describes such early copulation as common. The present observations are placed in an intermediate position, in that the flies as a rule copulated after several days, but sometimes on the day of emergence. Wilkening (1961) found that sperms of such freshly emerged males were fully capable of fertilizing eggs.

Both Barlow (1961) and Wilkening (1961) found great variation in total egg production of one female, with average values at 22-24° C and room temperature 404 and 419 respectively. Wilkening (1961) could not prove any connection between egg production and longevity of the female. Although kept under equal conditions, some females appeared to be much more productive than others through the whole oviposition period.

The duration of the oviposition period and the pattern of daily egg production presented in this paper cannot be compared directly with the results of Wilkening (1961) and Barlow (1961) due to different methods. The two authors both used artificial egg-laying terms, allowing the female to lay eggs during four hours every two days, regulated by presence and absence of aphids. No such restrictions were made in my experiments.

Efforts were made to keep the conditions constant in the glass jars every day throughout the oviposition period of the female. Nevertheless, the smaller peaks and bottoms in the egg-laying curves (Fig. 2) could be explained by varying strength of egg-laying stimuli (chemical, optical and tactile). However, the 2-3 distinct peaks and bottoms for each fly probably have physiological reasons. It seems that the females need a resting period to fill their ovaries after a week or more with unrestricted egg production.

Wilkening (1961) found that the percentage of fertilized eggs varied with the season, being ca. 40-60 per cent in April-May and ca. 80-90 per cent in July-September. Barlow (1961) found that mean fertility of *S. corollae* females was 67.3 per cent, and 69.1 per cent of these fertilized eggs hatched. Thus the hatching per cent (as defined on p. 79) was 46.5 per cent, which is considerably below those at both higher and lower temperatures in Table I. This could be explained by different seasons (Barlow: February-April) for the performance of the experiments.

The variation in the hatching percentage of eggs laid on different days by the same female (stippled lines in Fig. 2) is probably, at least to a certain degree, caused by sensory stimulation of the female which influences whether or not the sperms are released from the spermatheca of the female (Barlow 1961).

Temperature had a distinct effect on rate of development. Bombosch (1962a) and Wahbi (1967) have demonstrated that duration of larval stage, at least between 15° C and 25° C, is regulated by temperature and is independent of humidity. Values for time of development have mostly been investigated at temperatures between 20° C and 25° C (Barlow 1961 Wilkening 1961, Bombosch 1962a, Volk 1964, Wahbi 1967). The duration of larval and pupal stages found at 18° C and 28° C agrees fairly well with what has been found by other authors. Thus the lines between 28°C and 18° C in Fig. 3 would nearly coincide with the regression-lines for the values found in the literature between these two temperatures. A duration of the larval stage of 15 days at 15° C found by Wahbi (1967) is also about what could be expected from the present results.

The upper temperature limit for development of eggs, larvae and pupae in the laboratory has not yet been determined, but the moderate mortality at 28° C suggests a limit well above this temperature. The lower limit is below 6° C, for the larvae possibly between 4° C and 6° C. However, further experiments at 4° C have to be carried out. It has been found that larvae of *Syrphus ribesii* (L.) develop at 3° C (Sundby, unpublished), but these two species react rather differently on low temperatures.

Bombosch (1962a) states that the relative duration of each larval stage to the total larval period is independent of temperature and relative humidity. His conclusion is based upon experiments at 22° C, 23° C and 24° C. From his data on larval development, the ratios can be calculated to 0.3, 0.2 and 0.4, which are quite similar to those in Table III. It thus seems that the relative duration of each larval instar depends very little on temperature, at least between 6° C and 24° C.

Compared with 18° C, 8-28° C accelerated the development of eggs, had no significantly different effect on larval development, and retarded pupal development. However, all these differences were so small that the two temperature conditions can be said to have about the same effect on immature development. Furthermore, the rate of development was the same at 18° C and 8-28° C for all immature stages of *S. ribesii* (Sundby unpublished). Various experiments have shown that development is accelerated at fluctuating temperature conditions compared with the mean constant temperature (Odum 1959, Fritzsche et al. 1968). Similarly Andrewartha (1963) emphasizes that because of a non-linear relationship between temperature and speed of development, fluctuating temperature condition and the mean constant temperature have not always the same effect on development. However, the mechanisms effecting differences in development at the two temperature conditions are not yet fully understood. How the temperature fluctuates in relation to the threshold and optimum for development is of importance (Chapman 1931). Further, the total heat received must be considered if the effect of constant and varying conditions is to be compared (Fritzsche et al. 1968).

Barlow (1961) found that males of *S. corollae* had a quicker larval and pupal development than females at 22-24° C. The present results revealed no sex differences in larval development, but confirm the shorter pupal stage in males. This is a reasonable result if the sex-genes are supposed to be inactive during larval development.

The emergence of the adults followed the same pattern in Barlow's (1961) experiments as the one shown in Fig. 5. He found the sex ratio ♀/♂ = 44/56 = 0.8 compared with

♀/♂ = 119/90 = 1.3 in the present investigations. The two results suggest that the sexes emerge in about equal amounts.

Light proved to have little influence on speed of pupal development at 28° C. Wilkening (1961) came to the same conclusion with larvae at 24° C. Fritzsche et al. (1968) state that no decisive proof exists that light has a direct effect on speed of development in insects. The slightly faster larval development in darkness in the present study could be related to a possible effect of light on larval or aphid behaviour.

The available information about the hibernation of *S. corollae* is confusing and incomplete. As in other species of the genus *Syrphus*, diapause probably occurs, but the hibernating stage is unknown (Schneider 1958, Bombosch 1963). In the present study *S. corollae* completed development at 6° C in the laboratory without light, and eggs and larvae tolerated several days at 0°C with subsequent normal development. No signs of diapause were ever observed. However, this is not surprising, considering that the photoperiod rather than temperature or nutrition in most cases proves to be the primary inducing factor. Besides, too short as well as too long light period of the day prevents the induction of diapause (Fritzsche et al. 1968).

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Food Consumption at Various Temperature Conditions in Larvae of *Syrphus corollae* (Fabr.) (Dipt., Syrphidae)

ELINE BENESTAD

Benestad, E. 1970. Food Consumption at Various Temperature Conditions in Larvae of *Syrphus corollae* (Fabr.) (Dipt., Syrphidae). *Norsk ent. Tidsskr. 17,* 87-91.

Total and daily aphid consumption of *Syrphus corollae* (Fabr.) larvae were investigated at 8-28° C, 6° C and 28° C. The total food intake during the larval stage at the three temperature conditions was 307, 373 and 385 aphids *(Myzus persicae)* respectively. Newly hatched larvae, after being exposed to 0° C for two days, ate less at 8-28° C than the controls. On a diet of only two aphids per day, the larvae were not able to complete development. Most of them died in the 3rd instar, and two larvae underwent a third moult, yielding an uncommon 4th instar. Larvae fed on honey showed no growth but survived for 8-10 days, considerably longer than those given pollen or water. Pupal weight dropped about 7% during the first day and then stabilized at 32-33 mg.

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INTRODUCTION

Among aphid predators the aphidophagous syrphids play an important role because of the feeding habits of the larvae. Several studies on larval feeding have been carried out and different species tested (Hodek 1966, Schneider 1969).

Syrphus corollae (Fabr.) is common in Norway, yet feeding experiments on this species have only been carried out in other countries and only at constant and moderate temperature conditions (Bombosch 1962, Wahbi 1967). In the present study, food consumption of *S. corollae* larvae at varying and at fairly extreme temperatures was investigated, and the effect of other diet than aphids on larval development was tested.

MATERIAL AND METHODS

The material and methods have been described in my companion paper (Benestad 1970). Daily larval voracity was calculated as the difference between the number of aphids *(Myzus persicae)* offered to the larva each day and the number of aphids remaining a day later. During the starvation experiments, larvae were fed with pollen from dandelions *(Taraxacum vulgare)*. Pollen or honey were available ad libitum in small vials on moistened filter paper, which also represented the water source.

RESULTS

Larval aphid consumption

Total consumption. The aphid consumption of each larval instar at different temperatures is presented in Table I. At all temperatures the food consumption increased considerably from one instar to the next. Thus 1-4 per cent of the total food was eaten by the first instar, 9-16 per cent by the second and 80-90 per cent by the last instar. The larvae ate significantly less at 8-28°C than at 28°C or 6°C, while the difference between 28°C and 6°C was not significant.

Table I. Average number of aphids *(Myzus persicae)* consumed per larva of *S. corollae* at different temperatures

Temp. °C	n	1st instar X ± S. E.	2nd instar X ± S. E.	3rd instar X ± S. E.	Total X ± S. E.
8-28	117	11 ± 0, 5	40 ± 2. 3	258 ± 3. 7	307 ± 3. 3
6	21	8 ± 0. 6	60 ± 8. 3	307 ± 7. 6	373 ± 6. 9
28	18	3 ± 0. 2	39 ± 3. 6	345 ± 9. 3	385 ± 9. 1

Under natural conditions the newly hatched larvae may encounter a cold spell during the spring. In order to test for a possible influence of such temperature variations, newly hatched larvae were exposed to 0°C for two days prior to being transferred to 8-28°C conditions. Subsequently their food consumption and development were tested. No growth or feeding occurred at 0°C. The results, which are listed in Table II, show that the pre-cooled larvae ate significantly less (P = 0.02) than the control animals, although the difference was small (26 aphids). It has previously been shown that pre-cooling had no significant influence on the total duration of the larval period when the insects were raised in 8-28°C range (Benestad 1970).

Daily food consumption. Since different temperature conditions influence the duration of the larval period (Benestad 1970), the daily food consumption is affected. The effect on the average daily food consumption per larva is shown for four series in Fig. 1a-b, Fig. 2 and Fig. 3. In Fig. 3 the cumulative consumption is used because of unequal checking-intervals at this temperature.

At 8-28°C (Fig. 1a) most of the larvae (n = 15) of the series finished eating during

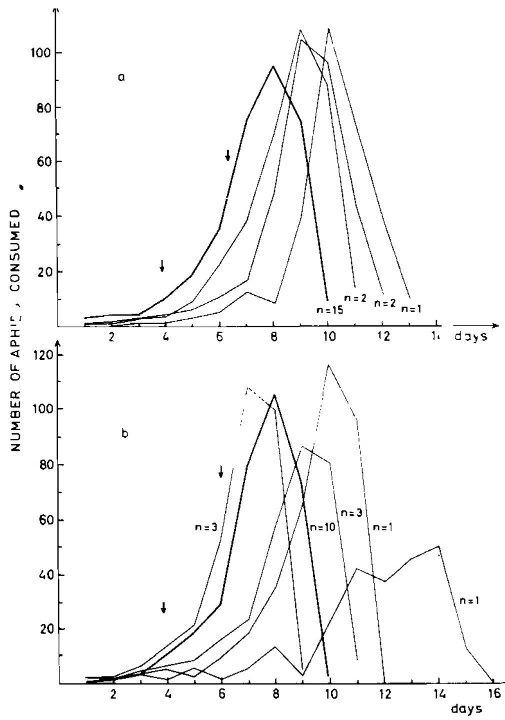

Fig. 1 a and b. Average daily aphid consumption per larva of *S. corollae* during development at 8-28° C. Larvae in *b* have been pre-exposed to 0° C for 2 days. Each curve illustrates the average feeding pattern of those larvae (n) pupating the same day. Arrows indicate average time of first and second moult for the whole series.

Table II. The effect of pre-cooling newly hatched larvae of *S. corollae* for two days at 0°C on subsequent food consumption at 8 - 28°C

	Pre-cooled		Control	
	n	Aphids consumed per larva	n	Aphids consumed per larva
1st instar	15	16	20	15
2nd intar	15	45	17	58
3rd instar	15	258	18	268
Total larval period	18	313	20	339

the 10th day and then pupated. The consumption increased rapidly after the final moult, reaching a maximum (approx. 100 aphids) halfway in 3rd larval stage. The voracity decreased considerably during the last days before pupation.

The larvae at 8-28°C pre-exposed to 0°C for 2 days (Fig. 1b) showed the same feeding pattern.

At 28°C (Fig. 2) most of the larvae (n = 16) finished eating during the 7th day. Principally, the pattern of food consumption was the same as in 8-28°C, except the curves at 28°C had a more compressed appearance due to quicker development. Here the larvae ate as much as 130-160 aphids daily, well above the quantity consumed by the larvae at 8-28°C.

Larvae at 6°C (Fig. 3) ate about 0.5 aphid per day as 1st instars and about 3 aphids per day as 2nd instars. The last moult was succeeded by a distinctly increased food consumption, the maximum (the 33rd day) being about 30 aphids a day. During the last days larval voracity decreased, as at the other temperatures, and pupation occurred on the 48th day.

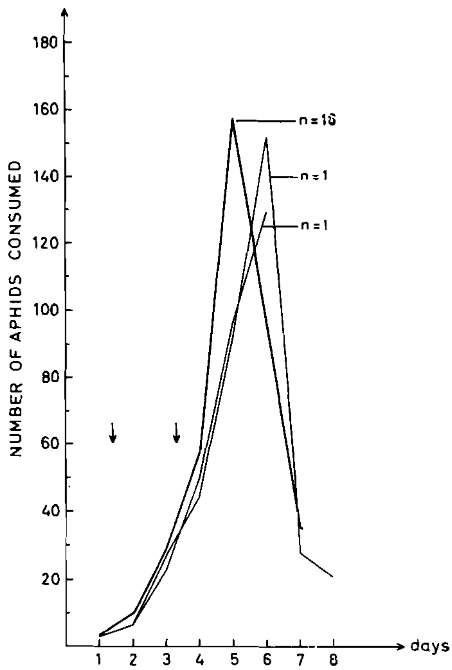

Fig. 2. Average daily aphid consumption per larva of *S. corollae* during development at 28° C. Explanation as in Fig. 1.

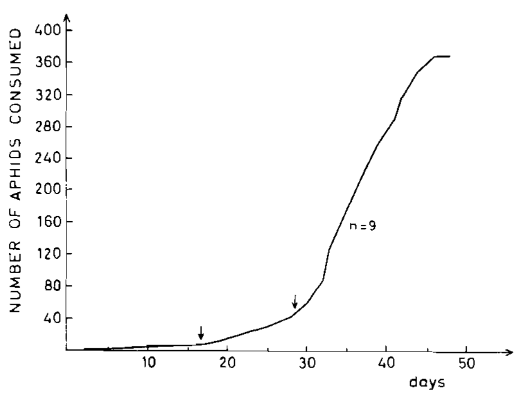

Fig. 3. Average cumulative aphid consumption per larva of *S. corollae* during development at 6° C. Arrows indicate average time of first and second moult.

The effect of quantity and quality of food on larval survival

Quantity. In order to test the effect of food quantity on larval development, a series of 17 larvae at 8-28°C were offered only 2 aphids per day. This proved insufficient for larval development (Fig. 4) and all of the larvae died within 18 days. As would be expected, the reduced food intake exerts its greatest effect during the later part of larval development when the normal demand for food is at its highest (Fig. 1). Six first instar larvae died, but most

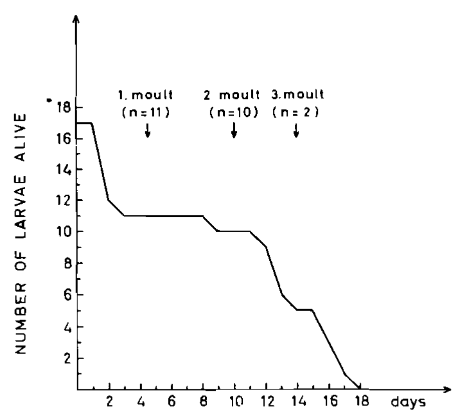

Fig. 4. Survival pattern of newly hatched *S. corollae* larvae offered two aphids per day at 8-28° C.

of them did so on the second day when food demand is small. Therefore it is felt that starvation was not the primary factor causing death.

Delay of the first moult was insignificant (0.6 days), but the 2nd instar lasted 5.5 days versus 2.4 days when fed ad libitum. The consumption of the 2nd instar was thus 11 aphids, which is about ⅕ of the consumption on an unrestricted diet. The mortality during the 2nd instar was insignificant when only one larva died.

Mortality in the 3rd instar increased and only two out of ten individuals survived this stage. After a period of two days (normal period 3.9 days) and a total consumption of about 22 aphids (normal consumption is 339 aphids) they moulted into an extra larval instar. This 4th larval instar is never found under adequate food conditions.

Quality. The effect of food quality, tested at both 8-28°C and 18°C, is shown in Fig. 5. No essential difference was found between the two temperatures. Furthermore, pollen provided no better survival value than water, both resulting in death of all larvae after 3-5 days. On the contrary, honey could keep the larvae alive for 8-10 days. However, these larvae had an insignificant growth and remained as 1st instars. Thus honey increased the survival time but was of no importance for development.

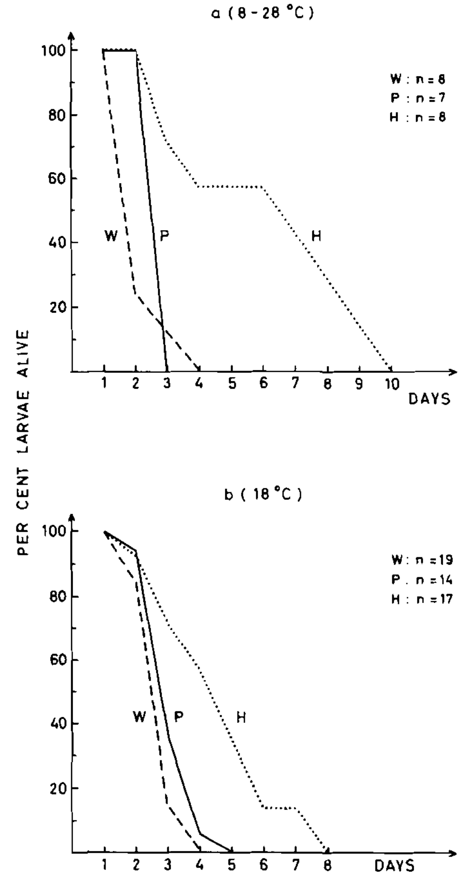

Fig. 5. Survival (in per cent of n) of newly hatched *S. corollae* larvae offered water (W), pollen (P) or honey (H) under two different temperature conditions.

Pupal weight

The average pupal weight from pupation to adult emergence is illustrated in Fig. 6 for two series at 8-28°C. The values for the last days are perhaps not representative because few pupae hatched.

Weight decreased 7 per cent during the first day after pupation and then stabilized at about 32-33 mg. The pupae from the larvae exposed to 0°C for 2 days weighed less throughout the pupal stage. These larvae also had a smaller aphid consumption (Table II). Generally the heaviest pupae were those that had the highest larval consumption and vice-versa.

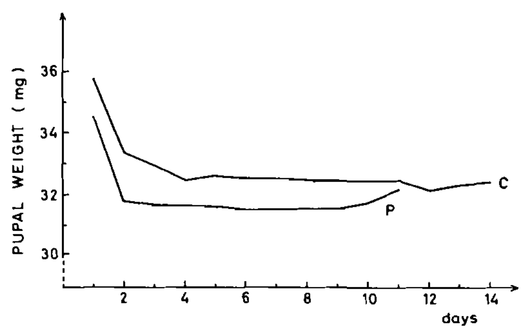

Fig. 6. Average pupal weight of *S. corollae* from two series developing at 8-28° C. P = 2 days' pre-exposure of newly hatched larvae to 0° C. C = Controls.

DISCUSSION

Both Bombosch (1962) and Wahbi (1967) found that larval food consumption was dependent on relative humidity. Low humidity is compensated by increased voracity and vice versa. However, such a simple correlation does not appear to exist between temperature and food consumption. Bombosch (1962) states that temperature primarily affects time of development and not food intake. The insignificant difference found in the present study between consumption at 6°C and 28°C suggests little or no influence of temperature on voracity. However, in Wahbi's (1967) experiments, aphid consumption varied with temperatures of 15°C, 20°C and 25°C, but the manner depended upon the relative humidity. In all cases, he found that most aphids were eaten at 25°C. Thus, if a dependence between temperature and food consumption of larvae exists, it is not a linear or exponential one. From Bombosch's (1962), Wahbi's (1967) and the present results, it seems likely that voracity is greatest towards the extreme temperatures.

Although it is difficult to compare larval consumption from different experiments due to different species and sizes of aphids, the pupal weight can give a rough indication of larval aphid consumption. The weights found at 8-28° C accord well with those found by Wahbi (1967) at 15° C and 20° C (30-33 mg).

Both Bombosch's (1962) and the present results reveal that a relatively constant percentage of the total aphid consumption is eaten by each larval instar, irrespective of temperature. Although the total number of aphids eaten was much greater in Bombosch's (1962) experiments, the relative consumption by the three instars was about the same as found in the present study.

The feeding experiments clearly show that the third instar larvae devoured the greatest portion of the total food consumed irrespective of temperature. Consequently this larval instar is the most effective in decimating aptiid populations. This is also attributed to their greater mobility and prowling, coupled with a low mortality.

The pattern of daily food consumption illustrated in Figs. 1 and 2 is not a generalized one for aphidophagous syrphids because the heavy increase in third instar is sometimes wanting (Bombosch 1962). As for *S. corollae* in general, the pattern seems to hold, resembling those at 15°C, 20°C and 25°C found by Wahbi (1967).

Under natural conditions, larvae of hover flies may encounter unfavourable conditions, when little or no food is available. Apparently such conditions are seldom critical unless the starvation period is too long. Both honey and limited sources of aphids were able to support life for several days or weeks, although resulting in arrested or retarded growth respectively. However, floral nectar is poorer in nutrient than honey, and its role in increasing larval survival is therefore doubtful. The minimal amount of aphids necessary for larval development into adults has not yet been determined, but is probably well above two aphids per day. Starvation experiments have been performed by Bombosch (1962). The period just after the second moult was especially sensitive to hunger, such treatment sometimes leading to hormonal disturbances. This is probably associated with the extreme food demand of the larvae immediately following the second moult.

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Trichoptera New to Norway

J. O. SOLEM

Solem, J. O. 1970. Trichoptera New to Norway. *Norsk ent. Tidsskr. 17,* 93-95.

The author reports eight species of caddisflies new to the Norwegian fauna: *Hydroptila pulchricornis* Pictet, *Ithytrichia lamellaris* Eaton, *Orthotrichia angustella* (McLachlan), *Oxyethira tristella* Klapalek, *Cyrnus insolutus* McLachlan, *Psychomyia pusilla* (Fabricius), *Oecetis notata* (Rambur), and *Setodes argentipunctella* McLachlan. The distribution of *H. pulchricornis, C. insolutus* and *O. notata* in Finland and Sweden in relation to the biotic zonation of Fennoscandia is briefly discussed.

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During 1967 and 1968 the author collected 8 species of Trichoptera which are new to the Norwegian fauna. Seven species were collected in the county of Östfold and one species in Sör-Tröndelag. Six of the species from Östfold were found along the Berby river near the town of Halden. A general description of the vegetation along the river has been given by Solem (1969 a, b).

The locality in Sör-Tröndelag, a rivulet flowing out of the lake Jonsvannet, just south of Trondheim, has been described by Solem (1967).

FAM. HYDROPTILIDAE

Hydroptila pulchricornis Pictet

Norwegian record: Ö: Halden, Femsjöen, 1 ♀ 30 July 1968.

In Finland and Sweden the species is recorded from the southern and central regions (Forsslund & Tjeder 1942, Forsslund 1953, Nybom 1960). *H. pulchricornis* is found commonly in the southern areas, while the records northwards are scarcer. The distribution elsewhere in Europe includes Britain and probably the whole continent (Botosaneanu 1967).

Ithytrichia lamellaris Eaton

Norwegian record: STi: Trondheim, Vikelva, 1 ♂ 1 ♀ 11 Aug. 1967.

In Finland the species is found in the southern, central and northwestern areas, where it is common near large and small rapids (Nybom 1960). In Sweden *I. lamellaris* is reported from a few localities in the south (Forsslund & Tjeder 1942, Forsslund 1953), and Tobias (1969) reports finds from Lule Lappmark in the north. Elsewhere in Europe *I. lamellaris* is found in Britain, Ireland and over the whole continent excepting the Mediterranean area (Botosaneanu 1967).

Orthotrichia angustella (McLachlan)

Norwegian records: Ö: Halden, Enningdal, 5 ♂ 5 ♀ 5 Aug. 1967, 2 ♂ 1 ♀ 8 Aug. 1968.

In Sweden the species has been recorded once, in the province of Närke (Forsslund 1953). According to Nybom (1960), *O. angustella* has not been recorded from Finland. Elsewhere in Europe the species is widely distributed (Botosaneanu 1967). *O. angustella* seems to be a rare species in Scandinavia and the two records referred to may represent the northern distribution limit of the species.

Oxyethira tristella Klapalek

Norwegian records: Ö: Halden, Enningdal, 1 ♀ 5 Aug. 1967, 2 ♂ 8 ♀ 8 Aug. 1968, Mjölneröd, 1 ♀ 30 July 1968, Lyserenelva, 1 ♂ 4 Aug. 1968.

In Finland and Sweden the species is distributed over the south and central regions (Forsslund & Tjeder 1942, Forsslund 1953, Nybom 1960). Botosaneanu (1967) gives the distribution elsewhere in Europe as being Britain, Ireland, and the northern and central areas of the continent.

FAM. POLYCENTROPIDAE

Cyrnus insolutus McLachlan

Norwegian record: Ö: Halden Holtet, 1 ♂1 ♀ 29 July 1968.

The species is distributed over the southern parts of Finland and Sweden (Forsslund & Tjeder 1942, Forsslund 1953, Nybom 1960). *C. insolutus* is very common, but local, in Finland (Nybom 1960). Other European finds are reported from Britain and the northern and central parts of the continent (Botosaneanu 1967).

FAM. PSYCHOMYIDAE

Psychomyia pusilla (Fabricius)

Norwegian record: Ö. Halden, Berby, 1 ♀ 1 Aug. 1968.

Widely distributed in Finland, Sweden and elsewhere in Europe (Forsslund & Tjeder 1942, Forsslund 1953, Nybom 1960, Botosaneanu 1967).

FAM. LEPTOCERIDAE

Oecetis notata (Rambur)

Norwegian records: Ö: Halden, Enningdal, 1 ♂ 2♀ 5 Aug. 1967, 1 ♂ 8 Aug. 1968, Berby, 5♀ 1 Aug. 1968.

In Finland and Sweden there are several finds of *O. notata* from the southern regions, though in Finland the species has also been recorded from Rovaniemi, which is situated close to the polar circle (Forsslund & Tjeder 1942, Forsslund 1953, Nybom 1960). Elsewhere in Europe *O. notata* is widely distributed (Botosaneanu 1967).

Setodes argentipunctella McLachlan

Norwegian records: Ö: Halden, Berby, 1 ♂ 5 Aug. 1967, 1♀ 1 Aug. 1968, Enningdal, 8 ♂ 15♀ 5 Aug. 1967, 2 ♂ 1♀ 8 Aug. 1968.

According to Forsslund (in lit.) *S. argentipunctella* has been recorded from three provinces, Skåne, Halland and Småland, in Sweden. The species is not reported from Finland (Nybom 1960). Other European finds are from Britain, Ireland and a few areas in the western part of the continent (Botosaneanu 1967). The records of this species from Halden are the northernmost in Europe.

DISCUSSION

With respect to the biotic zonation of Fennoscandia (Sjörs 1963), the northward distributions of *H. pulchricornis* and *C. insolutus* in Finland and Sweden correlate fairly well with the northern limit of the Southern Boreal subzone. This is also the case for *O. notata,* except for the record from Rovaniemi. According to Sjörs (1963) the Southern Boreal sub-zone is characterized by coniferous trees with scattered occurrences of nemoral species, particularly *Tilia cordata, Acer platanoides* and *Corylus avellana.*

Our present knowledge of the distribution of Trichoptera in Fennoscandia indicates that several southern species have a northern distribution limit, which coincides with that of the Southern Boreal sub-zone.

ACKNOWLEDGEMENTS

The investigation of the caddis fauna in Østfold in 1968 was supported by a grant from 'Nansenfondet', to which I am indebted. My thanks are also due to Professor K.-H. Forsslund, Stockholm for valuable help on the distribution in Sweden. Mr. P. Tallantire kindly checked the English.

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Contributions to the Knowledge of the Larvae of the Family Molannidae (Trichoptera)

J. O. SOLEM

Solem, J. O. 1970. Contributions to the Knowledge of the Larvae of the Family Molannidae (Trichoptera). *Norsk ent. Tidsskr. 17*, 97-102.

The larva of *Molanna albicans* (Zetterstedt) is described and illustrated, and notes given on its habitat and food. Drawings are also included of the larva of *Molanna angustata* Curtis and *Molannodes tincta* (Zetterstedt). Taxonomic characters on the pupal skins of *M. albicans* and *M. angustata* are described and illustrated. The taxonomic characters of the larvae are discussed, and a key to the known Norwegian larvae of the family Molannidae is provided.

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According to Brekke (1946), 3 species of the family Molannidae have been recorded in Norway, *Molanna albicans* (Zetterstedt), *M. angustata* Curtis and *Molannodes tincta* Zetterstedt, but only the larva of the two last species mentioned is known.

During an investigation of the bottom fauna of the lake Lille-Jonsvannet, near Trondheim, in 1967 and 1968, a few larvae of the genus *Molanna,* which did not agree with the descriptions given of *M. angustata,* were collected. Larvae, similar to those found in Lille-Jonsvannet, were collected on 5 August 1969 in a small pool in the Dovre area, Oppland county. The larvae were not reared to the imago stage. The following facts show, however, that the larvae belong to the species *Molanna albicans*. The Dovre larvae and pupal skins were collected together with the imago stage of *M. albicans,* and no other species belonging to the genus *Molanna* were found in the area surrounding the pool. The pupal skins have taxonomic characters which are similar to corresponding characters of the larvae found in the pool. The pool in question has an isolated position as regards other drainage systems in the area.

The taxonomic aspects of this paper refer to the genera and species only. For an identification of the larva, pupa, and pupal skin to the family level, I refer the reader to Ulmer (1909), Esben-Petersen (1916), Brindle (1961 a,b) and Hickin (1967).

MATERIAL

The description of the larva of *M. albicans* is based on a total of 27 specimens collected from 4 localities: Lille-Jonsvannet, Trondheim and Nedre Broksjö, Tydal, Sör-Tröndelag; Dovre, Oppland, and Engerdal, Hedmark. Additionally 7 pupal skins were found in the pool in the Dovre area. The length of the larvae ranges from 3 to 17 mm. Table I, which shows the number of the gills on the abdomen, is based on the examination of 13 larvae, 10-17 mm in length. The width of the head capsule and the length of the larvae and pupal skins, indicate that these larvae were in the last instar.

The material examined of *M. angustata* comprises 62 larvae and 2 pupae, and that of *M. tincta* 2 larvae.

All data obtained refer to material preserved in alcohol.

Table I. The number of the gills on the abdominal segments of the larva of *Molanna albicans*

Segments	Dorsal side	Lateral side	Ventral side
1	2-3	0	0
2	4	1-2	3
3	4	1-2	3
4	3-4	1-2	3
5	3	0-1	2-3
6	2-3	0-1	2-3
7	2	0	2

THE LARVA OF *MOLANNA ALBICANS* (ZETTERSTEDT)

The case

The cases of the larvae collected at Dovre were constructed of small sand-grains. In Jonsvannet small fragments of vegetable matter were used in addition to the sand-grains. The case has the same design as that of *M. angustata,* shield-shaped and convex, with a central conical tube. The lateral wings of the case often seem to be broken off or damaged.

The larva

Since the larva of *M. angustata* is well known and has been described by several authors (Silfenius 1905, Siltala 1907, Ulmer 1909, Esben-Petersen 1916, Hickin 1967), and because the larva of *M. albicans* is very similar to that of *M. angustata,* the present description of *M. albicans* will mainly be restricted to characters that may be used to separate the larvae of *M. angustata* and *M. albicans.*

Head (Fig. 1 a). Long, light yellowish-brown, with a brown to dark brown band running from the dorsal cervical area of the genae. The band, after reaching the aboral end of the clypeus, divides into two arms running along the margins of the clypeus and the genae. A narrow brown bar divides the clypeus transversely near the oral end. The clypeus has a median yellow band, extending from the transversely brown bar and towards the aboral end but not reaching the aboral apex. The aboral end of the clypeus is brown to dark brown. Gular sclerite bellshaped and completely dividing the genae. The gula and the ventral parts of the genae are brown. Both mandibles with two stout bristles at the base of the outer edge. The left mandible with four teeth and the right with three.

Thorax (Fig. 1b and c). The thoracic nota are very similar to that of *M. angustata.* Prothoracic notum sclerotized, and divided by a longitudinal suture. The brown markings on the posterior area are variable. The greater part of the prothoracic notum is yellow. Mesothoracic notum with two large sclerotized areas, divided by a longitudinal suture. The mesothoracic notum lacks the transverse suture which is present on *M. angustata.* In the middle of the meta-thoracic notum there is a small sclerotized patch.

Legs. The legs resemble those of *M. angustata.* However, there is no large curved spine emerging from the base of the claw on the meta-thoracic leg, as described by Hickin (1967) for *M. angustata.* Drawings of the tarsus of the legs of *M. albicans* are shown in Fig. 4.

Abdomen. The abdomen is greyish-white. Intersegmental grooves are well defined. The lateral line is present from segments 3 to 8. The fullgrown larva has filiform gills present on the segments 1 to 7 on the dorsal side, on the segments 2 to 6 at the lateral line, and on the segments 2 to 7 at the ventral side. The gills are in small groups of up to 4 in number, and the groups are situated near the anterior margin of the segments only. Table I shows the number of the gills found in each group.

The anal sclerite (Fig. 1 d), has 10 or 11 bristles in a row at the posterior margin. On the anterior area there is a transverse, light brown, patch. *M. angustata* has about 18 bristles on the anal sclerite and they are more irregularly located than on *M. albicans* (Fig. 2d). This may also be seen on the drawings made by Hickin (1967). The basal lobes of the anal claws of *M. albicans* (Fig. 1d) are each furnished with one brown spine. On each of these lobes *M. angustata* has several brown spines (Fig. 2d), up to about 18 in number on each lobe. The anal claws of *M. albicans* are short.

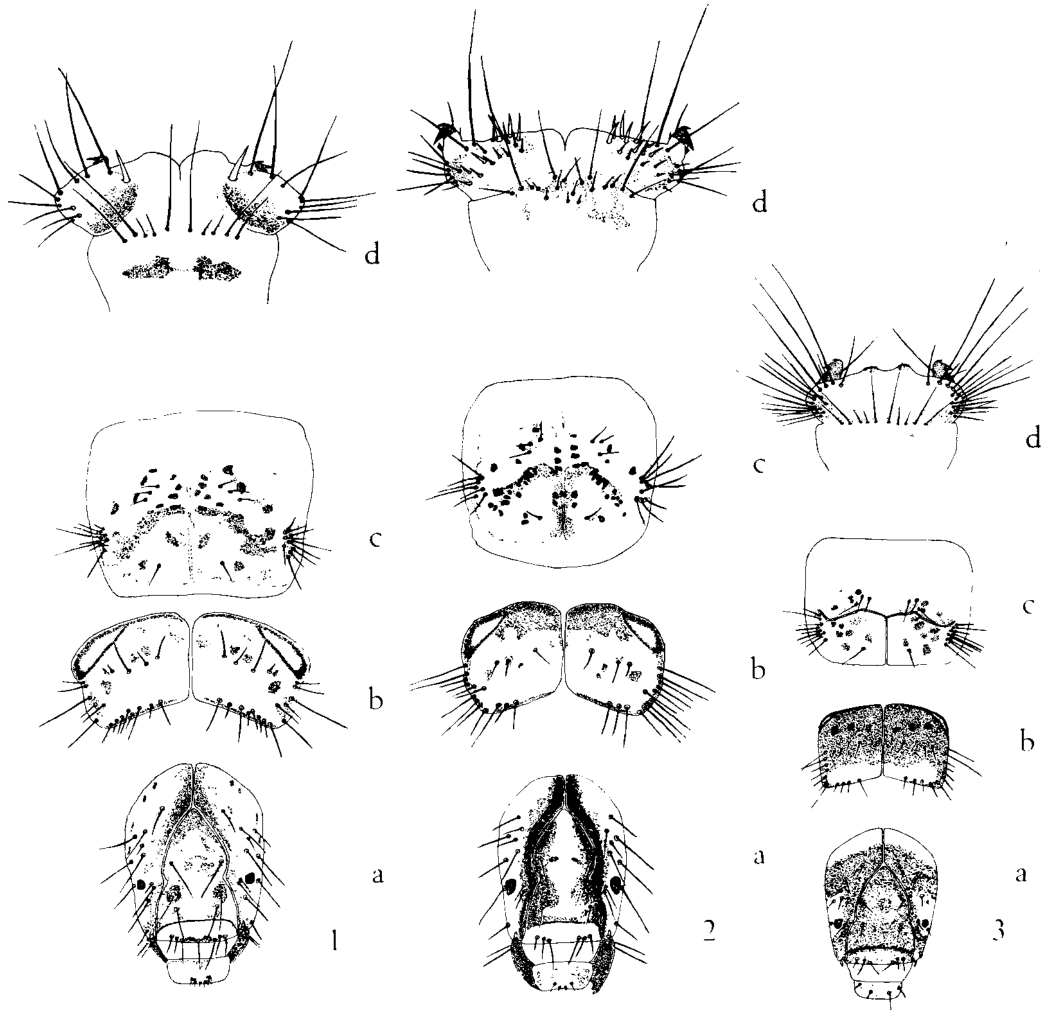

Fig. 1-3. Dorsal view of larvae. 1. *Molanna albicans;* 2. *Molanna angustata;* 3. *Molannodes tincta.* a. Head; b. Pro-thoracic nota; c. Meso-thoracic nota; d. Last abdominal segments.

Notes on the habitat and food

In the Dovre area the larvae of *M. albicans* were found in a small pool surrounded by moorland. The pool is situated in the sub-alpine birch woodland region, about 900-950 m above sea level, and its depth is about 1-1.5 m. In lake Jonsvannet, near Trondheim, situated in the coniferous region 149 m above sea level, the larvae were collected from the depth of 0.2 down to 5 m, and they occurred together with the larvae of *M. angustata.* Although sampling was carried out at several sites in Jonsvannet, the larvae of *M. albicans* were found in the samples from one site only. The locality is well sheltered and of the helophytes *Equisetum fluviatile* is conspicuous. Outside *E. fluviatile* is a dense belt of nymphaeids, and of the elodeids *Myriophyllum* sp. and *Potamogeton perfoliatus* are abundant.

A single larva from Nedre Broksjö was taken among *Myriophyllum* sp. at the depth of 1-1.5 m. Table II shows hydrographic data at two localities, Lille-Jonsvannet and Nedre Broksjö, where larvae of *M. albicans* have been found. Lille-Jonsvannet, although poor in nutrients, has several features similar to that of

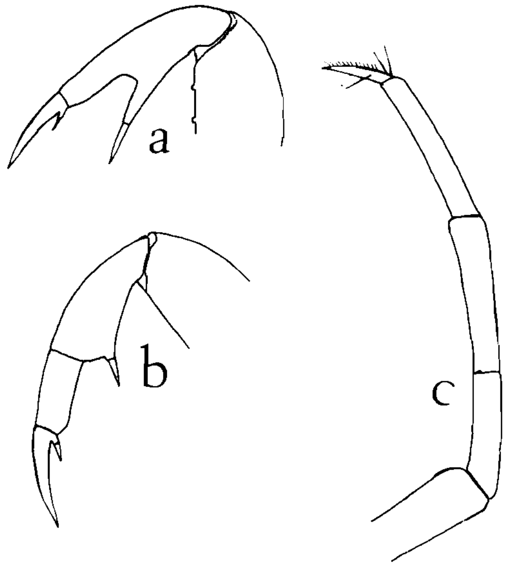

Fig. 4. Tarsus of the legs of *Molanna albicans:* a, pro-thoracic leg; b, meso-thoracic leg; c, metathoracic leg.

an eutroph lake, e.g. abundant macrovegetation, a decrease of oxygen content in the hypolimnion during stagnation periods (Holtan 1961), and must be regarded as intermediate between the typical oligotrophic and eutrophic lake. Nedre Broksjö belongs to the oligotrophic type.

The gut content of some larvae dissected consisted of filamentous algae, cladocera and larvae of chironomids. Among the cladocera the species *Alonopsis elongata* (Sars) and *Bosmina coregoni* Baird were identified. Filamentous algae and *A. elongata* were found in all larvae examined, while *B. coregoni* was found once. *A. elongata* was represented with several specimens in every larvae.

THE PUPAL SKIN

The length of the pupal skins of *M. albicans* is 11-12 mm, and the sclerotized hook-bearing plates are present at the anterior margin of the abdominal segments 3 to 6. On segment 5 is a hook-bearing plate also at the posterior margin. The anal processes are long and narrow, with a pair of bristles extending from their apical end. The dorsal side of each of the anal processes is furnished with 2 bristles, and all over they are covered with small spines. On abdominal segment 9 is a row with 10-11 bristles (Fig. 5 a), located in the same position as the bristles on the anal sclerite of the larva.

The pupal skin of *M. angustata,* 111-4 mm in length (Ulmer 1909), has 5-7 bristles on the dorsal side of the anal processes, and abdominal segment 9 is furnished with 18 bristles situated in the same position as those on the anal sclerite of the larva (Fig. 5b). Additionally there are several small bristles at the base of the anal processes.

The number of the bristles on the anal processes and the abdominal segment 9 on *M. angustata,* agree closely with the results of Siltala (1907). Therefore, these taxonomic characters of the pupal skins of *M. albicans* and *M. angustata* seem to be significant.

DISCUSSION ON TAXONOMIC CHARACTERS OF THE LARVA

Obviously there are some taxonomic characters which change during the growth of the larvae. One of these characters are the gills, which do not seem to be developed on segments 7 and 8 in *M. albicans* and *M. angustata*

Table II. Hydrographic data for Jonsvannet, Trondheim (after Holtan 1961), and Nedre Broksjö, Tydal. For Jonsvannet minimum and maximum values during 1960-61 are given. The measurements in Nedre Broksjö were carried out 8 Aug. 1969

Localities	pH	Specific conductivity	Total hardness mg/l	CaO mg/l	Cl^- mg/l	Alkalinity ml n/10 HCl/l
Jonsvannet	6.6-7.3	50.6-55.3	9.7-12.3		4.62-5.76	2.8-3.7
Nedre Broksjø	7.0	28	8.0	6.0	1.0	

respectively, untill the larvae have reached the length of 8-10 mm. At this critical length the number of gills in some groups have also increased to 4. Therefore, the gills may be used as taxonomic characters when the larvae are longer than 8-10 mm.

Other characters which change during the growth of the larvae are the colour, to a certain degree the markings on the head and thoracic nota and, on *M. angustata* only, the brown spines on the basal lobes of the anal claws. With respect to the colour and the markings on the head and thoracic nota, they may be used on larvae as small as 2-3 mm in length. Smaller larvae have, unfortunately, not been available.

The brown spines on the basal lobes of the anal claws of *M. angustata* increase in number during the development of the larvae. The lowest number counted on larvae 2-3 mm in length, was 3 spines on each lobe. The highest number counted on larvae 17 mm in length, was 18. The single brown spine on the basal lobes of the anal claws of *M. albicans* is present on larvae 3 mm in length, and must be expected to be present also in larvae newly hatched.

The number of the bristles on the anal sclerite seem to be fairly constant through the development of the larva because no variation was found in the different instars.

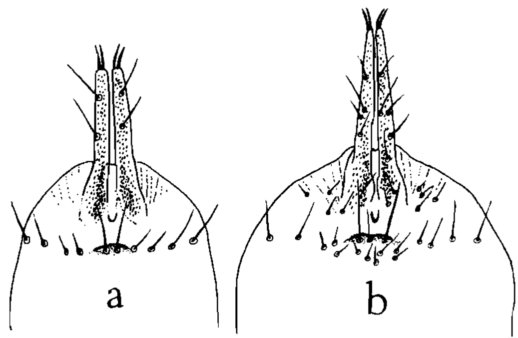

Fig. 5. Dorsal view of the pupal skin of: a, *Molanna albicans* and *b, Molanna angustata.*

A KEY TO THE KNOWN NORWEGIAN LARVAE OF THE FAMILY MOLANNIDAE

1. The claws on the meta-thoracic legs short (Fig. 4c). The basal lobes of the anal claws each furnished with only one or several brown spines (Figs. 1d, 2d). The front of the head with two brown or black bands and the clypeus with a yellow median band (Figs. 1a, 2a). The greater part of pronotum yellow. The gills in small groups of up to four in number. . . . . 3.

2. The claws of the meta-thoracic legs long (Fig. 6c). The basal lobes of the anal claws without brown spines. The front of the head brown, and no yellow median band on the clypeus (Fig. 3a). The greater part of the pronotum brown, a yellow area only at the anterior margin (Fig. 3b). The gills in small groups of up to two in number. . . . . *Molannodes tincta* Zetterstedt.

3. On the head a dark brown to black band running from the cervical area of the genae. The band bifurcating at the aboral apex of the clypeus. The median yellow band of the clypeus reaching the aboral apex (Fig. 2a). Each basal lobe of the anal claws furnished

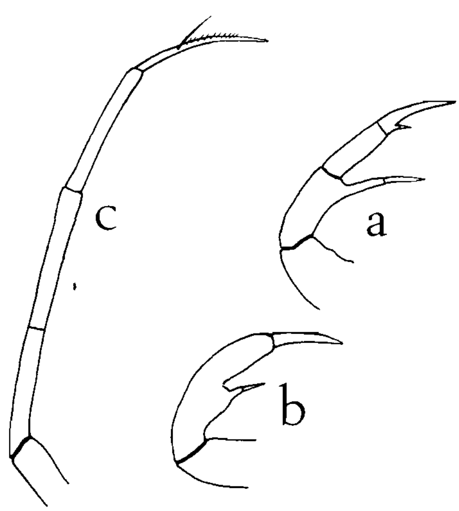

Fig. 6. Tarsus of the legs of *Molannodes tincta:* a, pro-thoracic leg; b, meso-thoracic leg; c, meta-thoracic leg.

with several brown spines (Fig. 2d). On the dorsal side gills are present on the abdominal segments one to eight.
. . . . *Molanna angustata* Curtis.

4. On the head a brown to dark brown band running from the dorsal cervical area of the genae. The band bifurcating beyond the aboral end of the clypeus. The yellow band of the clypeus does not reach the aboral apex which is brown to dark brown (Fig. 1a). Each basal lobe of the anal claws furnished with one brown spine (Fig. 1d). On the dorsal side the gills are present on the abdominal segments one to seven.
. . . . *Molanna albicans* (Zetterstedt).

ACKNOWLEDGEMENTS

The investigation in the Dovre area in 1969 was supported by a grant from 'Nansenfondet', to which I am indebted. I also wish to thank Professor E. Sivertsen for reading the manuscript and Cand. real. J. W. Jensen, who verified my identification of the cladocera. Cand. real. Chr. Andersen kindly placed at my disposal his collections from Engerdal, Hedmark.

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Hyptiotes paradoxus (C. L. Koch) (Araneae) in Norway

P. F. WAALER

Waaler, P. F. 1970. *Hyptiotes paradoxus* (C. L. Koch) (Araneae) in Norway. *Norsk ent. Tidsskr. 17,* 103-104.

The first record of *Hyptiotes paradoxus* (C. L. Koch) in Norway is described. Four females, one subadult male and two juvenile specimens were collected near Son, Oslofjord, 60 km south of Oslo.

P. F. Waaler, Kristins vei 30, Oslo, Norway

The first two specimens of *Hyptiotes paradoxus* (C.L. Koch) recorded in Norway were found by the author on 9 July 1969 near Son, Oslofjord, 60 km south of Oslo. The habitat was a shaded place in mixed forest, a few hundred metres from the sea. A female had spun its web between dry twigs of oak and aspen, about 175 cm above ground level, 1 m from and partly under a tall spruce. A subadult male was found on a dry spruce twig near by. In addition to oak and aspen, other trees in the vicinity included mountain ash, birch and juniper. The use of a sweep-net in the surrounding woods between 20 and 25 July 1969 resulted in three more females and two juvenile specimens being found. Fig. 1 shows one of the females from Son. Figs. 2 and 3 show the epigyn and vulva of one of the females.

The four females correspond with the descriptions given in the literature (Locket & Millidge 1951, Wiehle 1953, Brændegård 1966). It must be emphasized, however, that there is a striking color variation in one of them. The usual mixture of grey and brown in different shades has given way to a greenish appearance.

Some measurements of the four adult females are given in Table I.

The following species were also collected with *H. paradoxus: Clubiona* sp. juv., *Anyphaena accentuta* juv., *Philodromus* sp. juv., *Evarcha falcata* ♀, *Theridion tinctum* juv., *Theridion ovatum* ♀, *Araneus umbraticus* juv., *Entelecara erythropus* ♀♀, *Hypomma cornutum* ♀, and *Drapetisca socialis* ♀ and juv.

In Denmark *H. paradoxus* has been recorded in the following localities. Zealand: Fortunen, Rude skov, Geel skov, Grib skov and Tisvilde. Juteland: Hannerup skov and Löndal. In Sweden several finds are recorded from Skåne to Uppland and on Öland. *H. paradoxus* has not been recorded from Finland.

Fig. 1. A female *Hyptiotes paradoxus* from Son between spruce twigs.

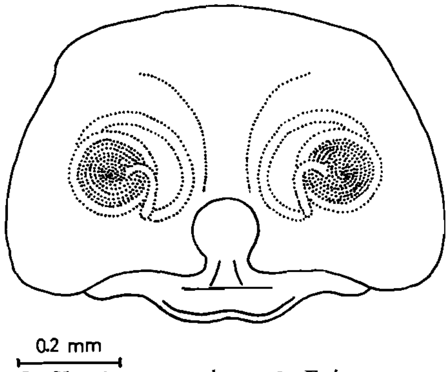

Fig. 2. *Hyptiotes paradoxus*, ♀. Epigyn.

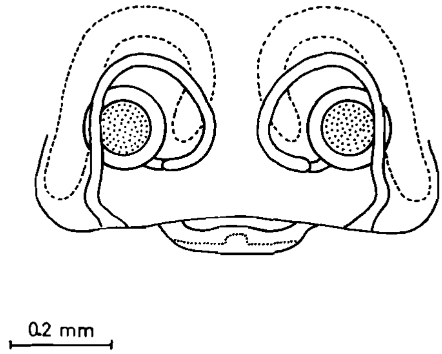

Fig. 3. *Hyptiotes paradoxus*, ♀. Vulva, dorsal view.

Table I. Some measurements (in mm) of the 4 females of *Hyptiotes paradoxus* from Son

	Leg-length				Spider-	Cephalothorax		Sternum	
	1	2	3	4	length	length	width	length	width
Femur	1.45	1.00	0.87	1.38					
Patella	0.65	0.50	0.35	0.68					
Tibia	0.88	0.53	0.40	0.98	4.3	1.5	1.6	1.05	0.63
Metatars	1.00	0.70	0.68	0.98					
Tars	0.45	0.40	0.43	0.43					
	4.43	3.13	2.73	4.45					
Femur	1.60	1.15	0.93	1.50					
Patella	0.66	0.52	0.38	0.65					
Tibia	0.88	0.53	0.48	1.00	4.3	1.5	1.67	0.75	0.50
Metatars	0.82	0.79	0.71	0.90					
Tars	0.43	0.39	0.48	0.49					
	4.39	3.38	2.98	4.54					
Femur	1.55	1.25	1.00	1.50					
Patella	0.60	0.55	0.40	0.75					
Tibia	0.88	0.58	0.47	1.05	4.3	1.67	1.77	0.88	0.58
Metatars	1.12	0.73	0.72	1.00					
Tars	0.48	0.46	0.50	0.55					
	4.63	3.57	3.09	4.85					
Femur	1.40	1.05	0.85	1.25					
Patella	0.58	0.55	0.38	0.60					
Tibia	0.75	0.40	0.35	0.75	4.0	1.50	1.50	0.78	0.55
Metatars	0.84	0.65	0.60	0.78					
Tars	0.44	0.38	0.38	0.41					
	4.01	3.03	2.56	3.79					
Mean values of all 4 females	4.37	3.28	2.84	4.41	4.23	1.54	1.64	0.87	0.57

ACKNOWLEDGEMENTS

For the information on Scandinavian records I am indebted to Fil. cand. Seppo Koponen, University of Turku, Finland, Mag. scient. Ole Böggild, Aars, Denmark and Professor Hans Kauri, Bergen.

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Six Species of Coleoptera New to Norway

A. FJELLBERG

Fjellberg, A. 1970. Six Species of Coleoptera New to Norway. *Norsk ent. Tidssk. 17,* 105-106.

Choleva fagniezi Jeann., *Epuraea guttata* Ol., *Cryptarcha strigata* F., *Haemonia* sp., *Phytobius waltoni* Boh. and *Ramphus oxyacanthae* Mrsh. are reported for the first time from Norway, together with notes on their habitats.

Arne Fjellberg, Zoological Museum, University of Bergen, Norway

Choleva fagniezi Jeann.

The first specimen was found under a stone on a moist meadow in mixed forest at Isdalen near Bergen, outer Hordaland (HOy). The date was 11 May 1968. The next specimen came two weeks later, this time at Lio in Kvinnherad, inner Hordaland (HOi). The animal was captured by a student expedition, and the locality was a heap of twigs in a clearing in deciduous wood. The heap was undermined by small rodents.

Epuraea guttata Ol. and *Cryptarcha strigata* F.

These two species were captured together at Tjöme in Vestfold (VE) 17 June 1969 at the the previous year, in August 1968, in fermenting attacks of *Cossus*. Both species were abundant and found associated with *Thamiaraea cinnamoptera* Gr., *Atheta nigricornis* Gr., *Soronia grisea* L., *S.punctatissima* Ill., *Librodor hortensis* Fourc., *Rhizophagus dispar* Payk. and some species of *Philonthus*. *Dorcatoma chrysomelina* Sturm. were found in the partly rotten tree trunk. *Cryptarcha strigata* was also found the previous year, in August 1968, in fermenting sap from Oak in Jarlsbergparken, VE:Sem. The sap came from a technical wound on the stem, not from an attack of *Cossus*. However, in July 1969 the species was captured in the same wood, and this time at Oak with *Cossus* attack. In the two last instances, no *E.guttata* were discovered.

Haemonia sp.

Fragments of Coleoptera were discovered by Cand. real. Jon Fjeldså during the examination of stomachs from two Slavonian Grebes *(Podiceps auritus)* captured in North Norway. Some broken pieces of elytra had the typical features of *Haemonia* sp. Several heads and some prothoraxes were also found. These fragments were sent to Victor Hansen in Copenhagen, and he stated that they corresponded fairly well with *Haemonia mutica* F., a species that occurs on *Ruppia* and *Potamogeton* in brackish water. But our fragments most possibly had come from fresh water. Remnants of one specimen were found in the stomach of a one week-old youngster of *Podiceps auritus* in Lake Myrvann in TRi:Skånland 22 July 1968. The other fragments (including twenty-two heads), came from th estomach of an adult female captured in Lake Vikevann in TRy: Sandtorg 20 June 1968. This stomach also contained at least seventy specimens of *Haliplus,* one *Hydroporus,* some *Donacia* and one *Carabidae* (? *Patrobus*).

The two lakes have vegetation of species of *Potamogeton*. Without doubt the *Haemonia* live here and in other lakes in North Norway. The species may be *Haemonia mutica* F. var. *lapponica* Hellén. This variant occurs in fresh water and was first discovered in the stomach of *Thymallus vulgaris* from a lake in North Finland (Hellén 1937). Our elytra fragments fit with the description given by Hellén.

The assumptions given above must of course be confirmed by closer examinations of the two actual lakes.

Phytobius waltoni Boh.

One specimen was found at the marsh Robergsmyra in VE:Stokke while beating with an insect net in the vegetation 6 July 1969. The species lives on *Polygonum hydropiper* (Hansen 1965) which is common in the bog.

Rhamphus oxyacanthae Mrsh.

This species was discovered on the leaves of a small, wind-cut cluster of *Sorbus* (? *intermedia*) at Mostranda, VE:Tjöme in July 1969. Imago was observed during July and August.

In Sweden the species is reported only from Skåne, but Hansen (1965) supposes that the distribution is incompletely known because of confusion with the similar species *R.pulicarius* Hbst.

ACKNOWLEDGEMENTS

I am indebted to Dr. Andreas Strand and Mr. Victor Hansen for verification of my determinations.

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Contribution to the Knowledge of Norwegian Orthoptera

A. FJELLBERG

Fjellberg, A. 1970. Contribution to the Knowledge of Norwegian Orthoptera. *Norsk ent. Tidsskr. 17*, 107-108.

Ten species of Orthoptera are reported for the first time from the county of Vestfold. *Meconema thalassinum* D. G. is reported new to Norway. Some notes on their habitats are given.

Arne Fjellberg, Zoological Museum, University of Bergen, Norway

The majority of Orthoptera are thermophilous and xerophilous insects, and only a few species have reached our country compared with South and Central Europe. Perhaps this is the reason why there has been so little advance in the study of these interesting insects in Norway. Knaben (1943) has summarized our knowledge of Norwegian Orthoptera until then. His list counts thirty-two species. Ander (1945) mentions thirty-seven species from Norway, including the synanthropic species. In 1953, a total of forty-nine species were found in Sweden (Ander 1953). The distribution of Orthoptera in Norway is still insufficiently known, and we must presume that several species new to our fauna will be found in the future.

In Denmark and Sweden, several species are supposed to be relics from the Post Glacial Warmth Period (Holst 1969). It is likely that such elements also exist in the climatically and edaphically most favoured districts of southeast Norway. Some of our species seem to have a disjunct distribution within this area (*Platycleis denticulata* Panz., *Sphingonotus cyanopterus* Charp.), but more field work is needed to decide whether their occurrence is of relic nature or not.

I have had the opportunity to make investigations in the county of Vestfold, and especially on the island of Tjöme in the outer Oslofjord. Some preliminary results are given below. Knaben (1943) has six species from Vestfold; this information only tells us that the area is extremely poorly investigated. In fact, this area can be predicted to have nearly the highest number of species in whole Norway.

For identification of the species, the works of Aurivillius (1918), Harz (1957) and Ragge (1965) were used.

Meconema thalassinum De Geer

The first Norwegian specimens of this delicate and graceful 'Oak Bush-cricket' were captured at Tjöme in late summer 1964. Since then, it has regularly been found in several places on this island (Kjære, Eidene, Gon, Mostranda). The adults are found in the period August-October (12 Aug.-4 Oct.) on different deciduous trees, especially Oak. The species is active during the night, and is often found creeping along house walls and windows attracted by light.

The species is common in Denmark, and is found north to Väster-götaland in Sweden. Thus the Norwegian locality is possibly the northernmost in Fennoscandia.

Conocephalus dorsalis Latr.

One female of this species was found by Thambs-Lyche at Hvaler in Östfold in July 1935. At Tjöme it is frequently found in saltmarshes and moist meadows with *Scirpus* and *Phragmites* near the seashore. The adults have been captured in the period late July to September.

Pholidoptera griseoaptera De Geer

This is a common species at Tjöme in gardens, hedges, bushes and wood meadows. Its song can often be heard along paths and roads in late summer evenings.

Leptophyes punctatissima Bosc.

Often together with the previous species at Tjöme. Frequently captured when beating with insect nets at bushes and lower vegetation in open deciduous forest. The species is very common in gardens, often visiting garden flowers. It can be seen creeping along house walls attracted to light in the evenings.

Nymphs of this species were also found on the island of Bastöy in VE: Borre, 3 July 1969.

Decticus verrucivorus L. and *Tettigona viridissima* L.

These two species are very common at Tjöme, and their songs can be heard everywhere in late summer. The first sings during the days, the latter during evenings and nights. *T. viridissima* is often attracted to light.

Sphingonotus cyanopterus Charp.

Two individuals of this characteristic species were captured at a warm, sun-exposed hillside in woodland at Tjöme in early August 1963. Unfortunately they were set free again. Later I have searched in vain for this rare species at suitable localities.

Received 7 April 1970

Psophus stridulus L.

The species can be found every late summer and autumn at a dry, south-faced hill-side with shrubs and small grass fields north of the railway station in Tönsberg.

Mecostethus grossus L.

This species is commonly associated with wet bogs having thriving, tall vegation. At Tjöme it is found on the border of the lakelet Kjynna. Other localities in Vestfold: Borrevann, VE: Borre and Robergsmyra, VE: Stokke.

Chortippus albomarginatus De Geer

Often found together with *Conocephalus dorsalis* in damp localities at Tjöme.

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Records of Ectoparasitic Insects and Mites on Birds and Mammals in Norway

REIDAR MEHL

Mehl, R. 1970. Records of Ectoparasitic Insects and Mites on Birds and Mammals in Norway. *Norsk ent. Tidsskr. 17*, 109-113.

This paper records the following 15 species of ectoparasitic insects and mites as new to Norway: Acarina; Ixodidae, *Ixodes caledonicus, Ixodes lividus, Hyalomma sp.*, Argasidae, *Argas vespertilionis.* Insecta; Anoplura, *Echinophthirius horridus, Enderleinellus nitzschi, Polyplax serrata, Hoplopleura acanthopus, Schizophthirus sicistae*, Haemodipsus leporis*, Haemodipsus lyriocephalus, Linognathus setosus, Solenopotes capillatus,* Diptera, Hippoboscidae, *Ornithomya fringillina,* Siphonaptera, *Typhloceras poppei.* Two species (*) are also new to Scandinavia.

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During the last few years I have collected ectoparastic insects and mites from many species of birds and mammals in Norway. Many localities scattered all over the country have been visited. This paper is a preliminary report and gives some records of species previously not listed as occurring in Norway.

The specimens are kept at the Zoological Museum in Oslo.

ACARINA
ORDER METASTIGMATA

Tambs-Lyche (1943a and b) gave a survey of the Norwegian ticks. He mentioned five species: *Ixodes ricinus* (Linné, 1758), *Ixodes hexagonus* Leach, 1815, *Ixodes arboricola* Schulze and Schlottke, 1929, *Ixodes trianguliceps* Birula, 1895 and *Ixodes uriae* White, 1852.

The following species are new to Norway:

Family Ixodidae

Ixodes caledonicus Nuttall, 1910

One ♀ taken from a starling *(Sturnus vulgaris)* on Akeröya, Hvaler, Östfold 2 June 1965 (leg. G. Lid).

The species has previously been reported from Denmark, Scotland, and Germany (Arthur 1955 and 1963), Göteborg, Sweden (Schulze 1930), and the Ukraine (Jemchuk 1960). The principal host seems to be the domestic pigeon, but several other species of birds are mentioned as hosts by these authors: *Columba livia, Sturnus vulgaris, Oenanthe oenanthe, Coloeus monedula, Corvus cornix, Corvus corax, Phoenicurus sp., Apus sp., Falco tinnunculus* and *Falco peregrinus.*

Ixodes lividus (C. L. Koch, 1884)

My material of this species is collected from nests of sandmartin *(Riparia riparia).* The localities of examined nests and records of *I. lividus* are shown on the map in Fig. 1. I did not find this tick in Northern Norway, but as I found it in the mountains of Dovre at an altitude of 850 m, I see no climatic reasons why it should not be found in the northern part of the country. Few nests were examined from each locality.

Records: 3 ♂♂ Levanger, Sör-Tröndelag 18 Oct. 1968 (leg. A. Hamstad); 1 ♀, unfed, Grav-

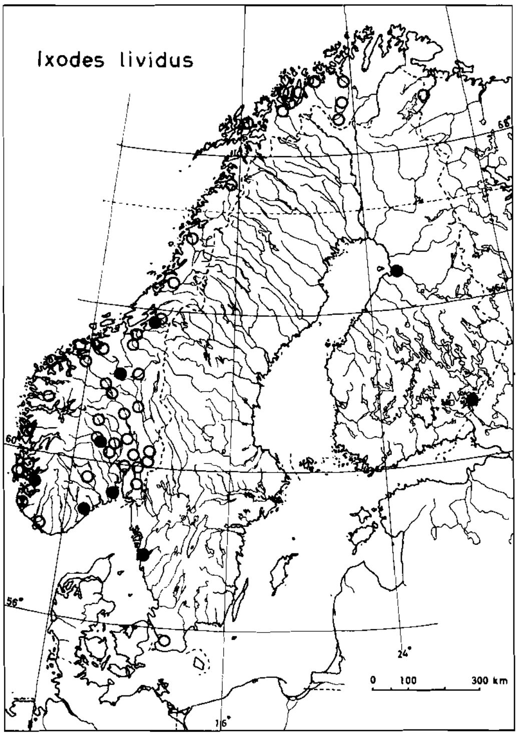

Fig. 1. Investigated colonies of sandmartin, *Riparia riparia* (filled and unfilled circles), with records of *Ixodes lividus* Koch, 1844 (filled circles only). A cross in the circle indicates that ticks were only seen on the sandmartins. Records outside Norway from Schulze (1930) and Nuorteva & Hoogstraal (1963).

bekken, Folldal, Hedemark 18 June 1967, altitude ca. 850 m, (leg. RM); 1 ♀, unfed, Liodden, Nes, Buskerud 2 Aug. 1969 (leg. RM); 1 ♂ 2 ♀♀, unfed, Hjelmeland, Rogaland 4 Sept. 1967 (leg. RM); 1 ♂ 6 ♀♀ and 3 nymphs, unfed, Våje, Moland, Aust-Agder 5 Sept. 1967 (leg. RM); and 34 larvae were collected 6 March 1969 in the laboratory from a great number of larvae crawling in a nest collected at Robergvannet, Stokke, Vestfold 5 Dec. 1968 (leg. J. Michaelsen). Amanuensis Tore Nilsen, Bergen Museum, saw ticks on the heads of sandmartins at Orre, Klepp, Rogaland July 1954 (personal communication). Probably these were *I. lividus*.

I. lividus is reported from Göteborg, Sweden (Schulze 1930). Ticks have also been seen on sandmartins at Röde mosse, Västergötland, Sweden (Curry-Lindahl 1961 p. 1529). Nuorteva & Hoogstraal (1963) gave two records of this tick from Finland, near Oulu and at Imatra. Elsewhere *I. lividus* has been reported from the British Isles, Germany, France, Switzerland, Czechoslovakia, Latvia, Russia and Siberia (Büttiker 1969, Arthur 1963 and Nuorteva & Hoogstraal 1963).

The only host is *Riparia riparia*.

Hyalomma sp.

Two specimens from *Phoenicurus phoenicurus* on Akeröya, Hvaler, Östfold 16 May 1964 (leg. G. Lid); 1 specimen from *P. phoenicurus*, Akeröya 20 May 1967 (leg. J. Michaelsen); and 1 specimen from *Achrocephalus scirpaceus*, Akeröya 3 June 1967 (leg. J. Michaelsen).

At spring-time, *Hyalomma* spp. are reported from migrating birds in Finland (Nuorteva & Hoogstraal 1963) and Hungary (Babos 1964). The species is brought to Middle and Northern Europe from southern countries.

Family Argasidae

Argas vespertilionis (Latreille, 1802)

Twenty-two larvae collected from 4 bats, *Pipistrellus pipistrellus*, at Solvang and Slagendalen, Tönsberg, Vestfold 28 and 30 June; 3 larvae from *Eptesicus nilssonii* at Slagendalen 16 July 1969 (leg. J. Michaelsen and R. Syvertsen). No *Argas* was found by Michaelsen on 2 *Myotis daubentonii* near Tönsberg 1968 or by myself on 7 *E. nilssonii* at Töyen, Oslo 1967 and 1969 and 12 *pipistrellus* at Modum, Buskerud 1969.

This tick is reported form near Stockholm, Sweden by Schulze (1930) and near Copenhagen and Helsingör, Denmark by Arthur (1955). It is widely distributed throughout Europe, USSR, and China, and if the identifications are correct, throughout Africa, S. Asia and Australasia (Thompson 1963). *A. vespertilionis* is host specific to bats and almost any bat species will serve as a host.

INSECTA
SUB. ORDER ANOPLURA

Brinck (1948 a, b, 1950) has given a survey of the Swedish lice. He has listed the Norwegian species based upon information given by Dr. L. R. Natvig, Zoological Museum, Oslo. The following 5 species are mentioned from Norway: *Polyplax borealis* Ferris, 1933, (type-host: *Clethrionomys rufocanus?) Polyplax spinulosa* (Burmeister, 1839) (host: *Rattus norvegicus), Haematopinus suis* (Linné, 1758) (host: *Sus scrofa), Pediculus h. humanus* Linné, 1758 and *P. humanus capitis De Geer,* 1778 (host: *Homo sapiens)* and *Phthirus pubis* (Linné, 1758) (host: *Homo sapiens).* Schöyen (1917) gave a record of *Haematopinus eurysternus* (Nitzsch, 1818) from *Bos taurus* near Sarpsborg, Östfold, but his determination may be questionable.

Information about the distribution of the species of lice in Scandinavia are taken from Brinck (1948a).

New records of lice:

Family Echinophthiriidae
Echinophthirius horridus (Olfers, 1816)

Many specimens from *Phoca hispida* Söröysund, Finnmark March 1966.

This species has a wide distribution on arctic seals. It is reported from Finland, Sweden and Denmark on *Phoca vitulina* and *Phoca hispida.*

Family Haematopinidae
Enderleinellus nitzschi Fahrenholz, 1916

1 ♂ 7 ♀♀ from *Sciurus vulgaris* on Malmöya, Oslo 3 Jan. 1967 (leg. E. K. Barth); 4 ♂♂ 9 ♀♀ and 5 nymphs from *S. vulgaris* at Fetsund, Fet, Akershus 5 Nov. 1967.

In Scandinavia, this species is known from Sweden and Denmark on *S. vulgaris.*

Polyplax serrata (Burmeister, 1839)

Many specimens from *Mus musculus* at Nes, Sunndal, Möre and Romsdal 19 July 1967 (leg. RM) and from *Apodemus sylvaticus* at Sogn, Oslo 4 April 1969 (leg. RM).

P. serrata is in Scandinavia known from Sweden and Denmark on *M. musculus* and *A. sylvaticus.*

Hoplopleura acanthopus (Burmeister, 1839)

Many specimens from *Microtus agrestis* Ostöya, Bærum, Akershus 6 June 1967.

In Scandinavia it is previously known from Finland, Sweden and Denmark on *Microtus agrestis, Clethrionomys glareolus, Arvicola terrestris* and *Mus musculus.*

Schizophthirus sicistae Blagoveshtchensky, 1965

Blagoveshtchensky (1965) described *S. sicistae* on 1 ♀ from *Sicista subtilis* from Prialtaisk steppe and *Schizophthirus similis* on 3 ♂♂ from *Sicista napaea* from Altlai.

This winter 1969 I have examined 54 specimens of *Sicista betulina,* dry skins and in alcohol, at the Zoological Museum in Oslo. I found 4 ♂ 16 ♀♀ and many eggs of *Schizophthirus sp.* on 3 specimens of *Sicista betulina* collected at Oppdal, Sör-Tröndelag 17 July 1916; Tydal, Sör-Tröndelag 31 Aug. 1913; and Vang, Oppland Sept. 1916. Only eggs were found on two specimens.

My specimens are very like those figured by Blagoveshtchensky (1965) and the populations on these three host species seem to be the same species of louse. A further description will be given later.

Haemodipsus leporis Blagoveshtchensky, 1966

2 ♂♂ 9 ♀♀ and many eggs from a young *Lepus timidus,* Storslett, Nordreisa, Troms 26 June 1967 (leg. RM).

This species was described by Blagoveshtchensky (1966) from *Lepus timidus* near Sverdlovsk and Lena in Siberia. It is very like *Haemodipsus setoni* Ewing, 1924 from North America, that was reported from Scotland, England and the Netherlands by Broek (1965). Further investigations may show that it is the same species.

Neither *H. setoni* nor *H. leporis* are previously reported from Scandinavia.

Haemodipsus lyriocephalus (Burmeister, 1839)

2 ♂♂ 1 nymph from *Lepus timidus* at Bygland, Aust-Agder 16 July 1930 (leg. P. Höst).

In Scandinavia the species is known from Finland, Sweden, and Denmark.

Linognathus setosus (Olfers, 1816)

Many specimens from dogs, *Canis familiaris,* at Bygdöy, Oslo 13 Oct. 1967; Malmöya, Oslo 3 Feb. 1969; and Atnasjöen, Stor-Elvdal, Hedemark ca. 1950 (leg. E. Barth and K. Krog).

L. setosus has a cosmopolitan distribution on dogs and is found in Finland, Sweden and Denmark.

Solenopotes capillatus Enderlein, 1904

1 ♀ 2 nymphs from *Bos taurus* in Odalen. In Scandinavia it is known from Finland and Sweden.

ORDER DIPTERA

Family Hippobosciade.

Six species of Hippoboscidae have hitherto been found in Norway: *Hippobosca equina* Linné, 1758; *Melophagus ovinus* (Linné, 1758) *Crataerina pallida* (Latreille, 1812); *Stenepteryx hirundinis* (Linné, 1758); *Ornithomya avicularis* (Linné, 1758) and *Ornithomya chloropus* Bergroth, 1901 (Siebke 1877, Collett 1921, Natvig, 1941 and Hill, Hackman and Lyneborg 1964).

Ornithomya fringillina Curtis, 1836

1 ♂ 2 ♀ from *Parus caeruleus, Sitta europaea* and *Phylloscopus collybita* at Nes, Sunndalen, Möre and Romsdal 12 and 13 Aug. 1966 (leg. RM); 1 ♀ from *Phylloscopus trochilus* at Kambo, Moss, Östfold 16 Aug. 1967 (leg. G. Lid).

In Scandinavia this species is known from Denmark and the southern parts of Finland and Sweden (Hill, Hackman and Lyneborg 1964).

ORDER SIPHONAPTERA

According to Mehl (1968), 48 species of fleas are found in Norway. If *Ceratophyllus riparius freyi* Nordberg, 1935 is regarded as a subspecies of *Ceratophyllus styx* Rothschild, 1900 the actual number is 47.

Typhloceras poppei Wagner, 1902

1 ♂ from Apodemus sylvaticus at Byhaugen, Stavanger 22 July 1968 (leg. RM).

T. poppei has a western distribution in Europe and is known from Sweden and Denmark (Ander 1946, Smit 1954). It is monoxenous on *Apodemus sylvaticus.*

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Cheilosia sootryeni nov. sp. (Dipt., Syrphidae), a Norwegian Species Resembling *Ch. vernalis* Fallén

TORE NIELSEN

Nielsen, T. 1970. *Cheilosia sootryeni* nov. sp. (Dipt., Syrphidae), a Norwegian Species Resembling *Ch. vernalis* Fallén. *Norsk ent. Tidsskr. 17,* 115-118.

Cheilosia sootryeni nov. sp. is described from the vicinity of Bergen, Western Norway. A comparison is given between this and the nearly allied *Ch. vernalis,* figuring male genitalia and heads of the two species.

Tore Nielsen, Zoological Museum, University of Bergen, Muséplass 3, 5000 Bergen, Norway

Cheilosia sootryeni nov. sp. is a medium-sized, rather stout species; body colour black, with slightly aeneous lustre on abdomen; pubescence usually mainly yellow. Like *Ch. vernalis* Fall., it belongs to group D of Sack (1932) (eyes hairy, face bare, scutellum with bristly hairs at margin).

MALE

Head. Eyes brown-haired; the hairs few and more scattered below and usually quite wanting towards jowls (Fig. 1A). Angle of approximation nearly 90°. Frons shining black, narrowly whitish dusted along eye-margins, blackhaired. Lunulae yellowish brown to dark brown. Face with a triangular greyish spot on each side, pointing from eye-margins inwards towards lower base of antennae. Upper part of face rather evenly sloping towards central prominence, which is almost or quite as much produced as upper mouth edge (Fig. 1B). The black ground colour dulled by light greyish-yellow dusting, face otherwise bare. Jowls moderately shining, slightly greyish-yellow dusted. Occiput silvery greyish or greyish-yellow dusted on lower and middle part, more shining back on upper parts towards vertex; it is yellow-haired and with a row of bristly, black hairs on upper half towards eye-margins. Vertical triangle black-haired. Antennae varying in colour from greyish orange to dark brown; 3rd joint roundish, usually a little longer than deep. Arista rather long, a little thickened at base; shortly pubescent.

Thorax. Mesonotum and scutellum coarsely punctate, shining black. The hairs of unequal length, varying from mainly yellow to mainly black; when mainly yellow, then lateral parts of mesonotum more or less black-haired. Hind margin of scutellum with some bristly black hairs. Pleurae less densely haired, shining black. The hairs yellow and black. Wings tinged slightly greyish-brown, a little darker brownish-yellow towards front edge of wing; stigma yellowish brown. Squamulae whitish, fringe varying from yellow to brown. Halters lighter or darker brown, the knob usually darkened. Legs predominantly black. Femorae black with only extreme tips yellow. Tibiae yellow (sometimes more obscurely so) on basal $^1/_3$-$^1/_2$ and on apical $^1/_8$-$^1/_{10}$. Tarsi black above, blackish to yellowish brown below. The pubescence mainly short and black; the black hairs long and bristly behind and below on front femorae, below on middle femorae, but also on front side and below on apical half of hind femorae. There are long, yellow hairs mainly on coxae and on hind side of basal half of middle legs; the hairs short and yellow medially and below the tibiae and tarsi on

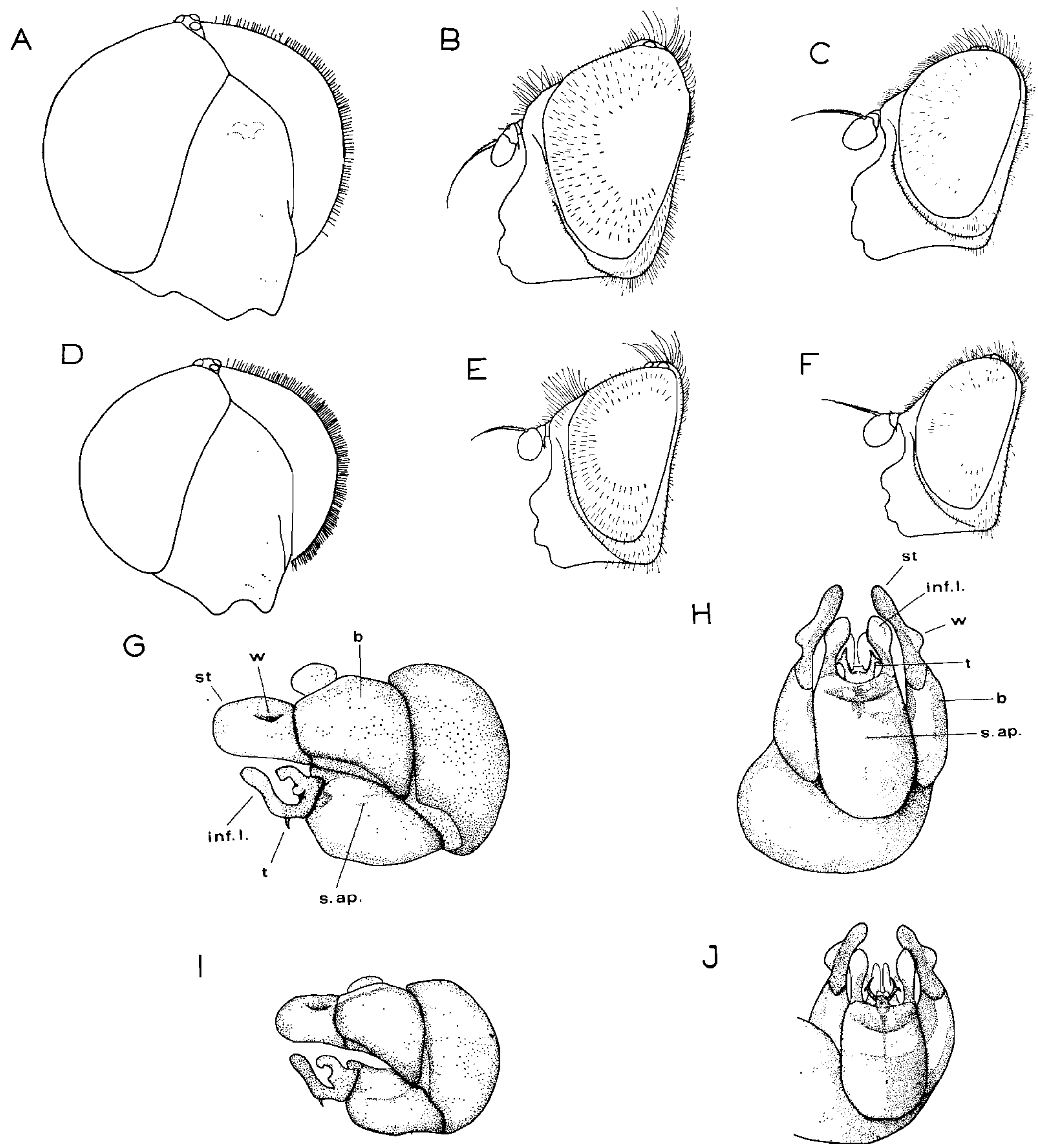

Fig. 1. A-C, G, H: *Cheilosia sootryeni* nov. sp. A-B. Head of male. C. Head of female. G. Male genitalia in dextrolateral view. H. Male genitalia in ventral view. D-F, I, J: *Cheilosia vernalis* Fall. D-E. Head of male. F. Head of female. I. Male genitalia in dextrolateral view. J. Male genitalia in ventral view. Abbreviations: b = basale; inf. 1. = inferior lobe; s. ap. = sustentacular apodeme; st = stylus; t = tubus; w = wing of stylus.

front and hind legs. Wing length: 7.2-8.8 mm (mean length 8.0 mm).

Abdomen. Rather coarsely punctate. Glittering black on tergite 1 and 4, and on some triangular areas spreading inwards from side margins of tergite 2 and 3; otherwise slightly dulled and less brightly shining. The pubescence short and black on medioposterial (dulled) parts of tergite 2 and 3, otherwise yellow. The hairs are rather long on side margins of tergite 1-3, reaching maximum length on anterial half of tergite 2. Sternites shining black; the hairs yellow; long and erect on sternite 1 and 2, otherwise mainly short and depressed. Genitalia yellow-haired. Genital structures are figured in Figs. 1G-H and 2A. Body length: 7.9-9.1 mm (mean length 8.4 mm).

FEMALE

Head. Eyes less densely haired than in the male, and the hairs shorter. Frons not very broad; at vertical triangle as broad as about half the width of an eye, somewhat widening downwards. Lateral channels distinct, middle channel less readily seen or quite wanting. On lower half of frons a transverse groove may often be seen above the lunulae. Frons shortly yellow-haired, but black hairs at vertical triangle and in front of it, and sometimes also just above the lunulae. Antennae with 3rd joint larger than in the male (Fig. 1C).

Thorax. Pubescence shorter than in the male, as long as about ⅖ of the length of 3rd antennal joint; it is erect or only slightly depressed, predominantly yellow. Legs chiefly as in the male, but the yellow parts usually more clearly so, and pubescence shorter. Wing length: 7.3-7.9 mm (mean length 7.5 mm).

Abdomen. Ovate; coarsely punctate but shining black on all tergites. It is covered with short, yellow pubescence, the hairs longer on the sides of tergites 1-2, and, as in the male, reaching maximum length at base of the latter. Sternites shining black, the yellow hairs mainly short and depressed, but longer and more erect on sternite 2. Body length: 7.4-8.5 mm (mean length 7.7 mm).

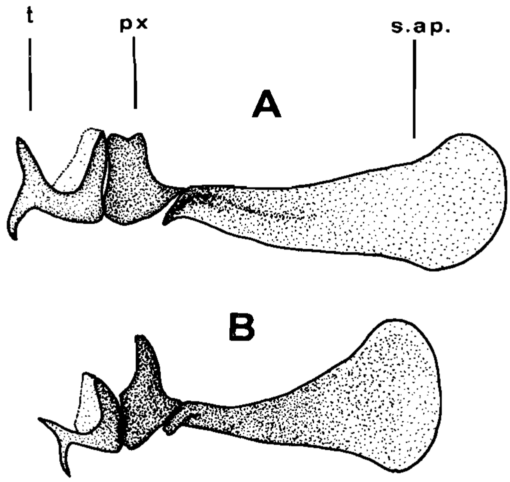

Fig. 2. Axial system of penis in dextrolateral view. A. *Cheilosia sootryeni* nov. sp. B. *Cheilosia vernalis* Fall. Abbreviations: px = pyxis; s. ap. = sustentacular apodeme; t = tubus.

COMPARISON WITH *CH. VERNALIS*

Ch. sootryeni seems to be nearly allied with *Ch. vernalis* Fall., with which it was often caught in the same biotope. The differences listed in Table I may be noted (genitalia nomenclature mainly after Gaunitz (1960) and Metcalf (1921)).

Ch. sootryeni appears to be an early occurring species; it has exclusively been caught in spring, during the period of 12 May to 11 June. *Ch. vernalis* has a wider period of appearance, ranging from March to September (Coe 1953).

MATERIAL

The specimens were collected in the vicinity of Bergen in the years 1966-1968. *Holotype.* ♂ specimen dated Paradis, HOy: Fana, 14 May 1967 (Tore Nielsen leg.). *Paratypes.* Isdalen, HOy: Bergen, 9 June 1966 (1 ♂, Tore Nielsen leg.), 12 May 1967 (1 ♂, Arne Fjellberg leg.). 15 May 1967 (2 ♂♂, 1 ♀, Tore Nielsen leg.), 25 May 1967 (4 ♂♂, 2 ♀♀, Arne Fjellberg leg.), 26 May 1967 (1 ♂, 3 ♀♀, Tore Nielsen leg.); Bergen, HOy: Bergen, 11 June 1966 (1 ♀, Arne Fjellberg leg.); Paradis, HOy: Fana, 14 May 1967 (3 ♂♂, 1 ♀,

Table I. A comparison between *Ch. sootryeni* nov.sp. and *Ch. vernalis* Fall.

Ch. sootryeni nov.sp. (Figs. 1A-C,G,H and 2A)	*Ch. vernalis* Fall. (Figs. 1D-F,I,J and 2B)
Eyes less densely haired than in *Ch. vernalis*; on lowest parts of eyes, towards jowls, the hairs very scarce or quite wanting. The hairs also relatively shorter than in *Ch. vernalis* (Fig. 1D); they are all dark.	Eyes densely haired, even on lowest parts of eyes, towards jowls. The hairs relatively long; they are dark above, pale below.
Face rather evenly sloping from hollow below antennae to central prominence.	Face more 'nosy', central prominence more distinct.
All tarsi black above.	Basal tarsal joints of middle legs often yellow; sometimes also on front and hind legs.
Genitalia with inferior lobes (dextrolateral view) bowed. Styli rather long, and styli wings relatively small. Pyxis and sustentacular apodeme proportionally low.	Genitalia with inferior lobes more erect. Styli shorter, and styli wings relatively larger. Pyxis rather tall; sustentacular apodeme slender basally, tall distally.
Medium-sized species: wing length 7.2-8.8 mm; body length 7.4-9.1 mm.	Rather small species: wing length (after Coe (1953)) 4.5-6.75 mm; body length (after Sack (1932) and Lundbeck (1916)) 5-7 mm.

Tore Nielsen leg.), 25 May 1967 (2 ♂♂, 2 ♀♀, Tore Nielsen leg.), 22 May 1968 (1 ♀, Tore Nielsen leg.). The type material totals 26 specimens; 15 ♂♂ and 11 ♀♀. It is deposited in the collections of Zoological Museum, Entomological Dept., University of Bergen.

Type locality. Paradis is an hilly area with deciduous forests and cultivated fields 6 kms S of the city of Bergen. Isdalen, the locality of some of the paratypes, is a valley close to Bergen city, between the mountains Flöyen and Ulriken. Main vegetation is birch and spruce forests.

Ch. sootryeni was collected on meadows at the border of forests and in forest glades, some of them on flowering *Ranunculus ficaria* L. and *Anemone nemorosa* L. Two pairs were caught in copula on 25 May 1967.

ACKNOWLEDGEMENTS

This species is dedicated to Director Tron Soot-Ryen, Oslo. I am greatly indebted to him for his generous help and kind advice concerning Syrphidae.

I also wish to express my sincerest thanks to Professor A. A. Stackelberg, Leningrad, who kindly examined the species, and to stud. real. A. Fjellberg, Bergen, for permission to use specimens from his collection.

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Koleopterologiske bidrag XV

A. STRAND

Strand, A. 1970. Koleopterologiske Bidrag XV. *Norsk ent. Tidsskr. 17,* 119-121.

Es wird auf einige für die norwegische Fauna interessante Käferarten aufmerksam gemacht, darunter die folgenden für Norwegen neue Arten: *Laccophilus stroehmi* Ths., *Triarthron maerkeli* Schm. *Hister corvinus* Germ., *Dasytes aerosus* Kies., *Reesa vespulae* Milliron, ein fragliches Exemplar von *Scymnus apetzoides* Capra & Fürsch, *Rhopalodontus strandi* Lohse, *Palorus ratzeburgi* Wissm. und *Scolytus rugulosus* Ratz. *Choleva glauca* Britten und *Rhopalodontus perforatus* Gyll. sind nicht, wie früher vermutet, norwegische Arten.

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Agonum munsteri Hellén. Et eksemplar som jeg tok i oppskyll ved TRi: Rundhaug i Målselv den 25/6 1937, har vist seg å være denne arten, som i Norge ellers bare er kjent fra områdene HEs og NTi.

Laccophilus stroehmi Ths. Arten er beskrevet etter eksemplarer fra Hälsingland i Sverige og er ikke kjent fra andre svenske områder. I den nordiske billekatalogen (Lindroth 1960) er den oppført fra flere finske områder, og nå viser det seg at eksemplarer fra VAy: Kristiansand, samlet av Warloe og av ham bestemt som *minutus,* i virkeligheten er *stroehmi,* som er ny for Norge. I Oslomuseet står dessuten et eksemplar uten lokalitet samlet av Esmark.

L. stroehmi har alment vært regnet som ab. til *minutus,* men Brinck (1942) har påvist at det er en egen art, som i det vesentlige skiller seg fra *minutus* ved bredere og mer hvelvet form, kraftigere mikroskulptur, som på dekkvingene består av meget små, runde celler. Hos *minutus* har penis, sett fra siden, en innbuktning på oversiden i den basale halvdelen, og undersiden er rundet, mens *stroehmi* har oversiden jevnt rundet og undersiden mer rettlinjet og vinkelformet. Venstre paramer ser, etter det undersøkte materiale å dømme, ut til å være litt spissere hos *minutus* enn hos *stroehmi.*

En følge av at *stroehmi* har vært regnet som aberrasjon er at det ikke foreligger sikre opplysninger om utbredelsen. Everts (1903) oppgir at så vel *minutus* som *stroehmi* er vanlige i Nederland. Som kjennetegn for *stroehmi* nevner han at den er meget mørk med litt mer hvelvete og litt tydeligere punkterte dekkvinger enn hos *minutus,* men hverken mikroskulptur eller penisform er nevnt. Det er derfor neppe sikkert at det gjelder *stroehmi.*

Choleva glauca Britten utgår som norsk art.

Triarthron maerkeli Schm. Et eksemplar av denne arten, som er ny for Norge, har A. Bakke tatt i en felle i AAy: Åmli.

Acrotrichis cognata Matth. *(platonoffi* Renk.) Av denne arten, som fra N.-Norge tidligere bare var kjent i et eksemplar tatt av Sjøberg i TRi: Nordreisa, ble et eksemplar tatt i en felle som A. Bakke satte opp i Fø: Vaggatem i Pasvik.

Acrotrichis insularis Mäkl. Et eksemplar av denne arten, som først nylig er blitt kjent fra Norge, tok jeg den 12/10 1969 i råtten *Armillaria mellea* på AK: Kjelsås. A. Bakke har tatt den i den felle i AAy: Gjerstad.

Phyllodrepa clavigera Luze. I den ovennevnte felle i Fø: Vaggatem ble tatt et eksemplar av denne meget sjeldne arten, som i Norge tidligere bare er funnet i Bø: Kongsberg og i TRi: Sætermoen.

Arpedium brachypterum v. *gyllenhali* Sahlb. Av denne formen, som har utviklede flygevinger og lange dekkvinger, og som hos oss tidligere bare er oppgitt fra On, fant jeg den 12/5 1967 et nyklekt eksemplar i oppskyll ved AK: Røa.

Philonthus parcus Sharp. En orientalsk art, som først nylig er oppgitt fra Europa, og hos oss er funnet på AK: Kolsås og On: Vålåsjø. Den 25/8 1968 tok jeg to eksemplarer på utlagt duelort på AK: Brønnøya i Asker.

Bolitochara lucida Grav. Ifølge Horion (1967) skal E. Jünger i juli og august 1935 ha tatt flere eksemplarer av denne arten i MRi: Romsdal. Arten er hos oss ellers bare kjent fra noen få lokaliteter på Østlandet (Ø, HEn, Bø).

Atheta (Microdota) palleola Er. Av denne arten, som er utbredt i M.-Europa, men i de nordiske land bare er kjent fra Uppland og Lule lappmark i Sverige og fra Ø: Hoffsrød i Idd, ble ett eksemplar tatt i den ovennevnte felle i Fø: Vaggatem.

Oxypoda hansseni A. Str. I den nevnte felle i Fø: Vaggatem ble tatt et eksemplar av denne arten. Den er tidligere bare kjent fra noen få norske lokaliteter i S.-Norge og fra Jämtland og Norrbotten i Sverige.

Oxypoda brachyptera Steph. f. *obscura* Korge. Av denne formen, som er karakterisert ved sin dypt mørkebrune farge, og som ble beskrevet av Korge (1959) etter to eksemplarer fra omegnen av Kiel, tok jeg den 1/8 1964 et eksemplar på VE: Sandøy ved å sikte planterester på sandet strandbredd.

Aleochara stichai Likovsky. 5 ♂♂ og 2 ♀♀ av denne nylig beskrevne arten tok jeg i råtten *Armillaria mellea* på AK: Røa den 4/10 1969.

Hister corvinus Germ. I lektor Hanssens samling står et eksemplar av denne arten, som er ny for Norge, tatt i Ø: Skjeberg den 6/6 1915. Viktor Hansen har bekreftet bestemmelsen.

Dasytes aerosus Kies. Også en ny art for landet, som lektor Hanssen har tatt i et eksemplar i AAy: Grimstad den 11/7 1907.

Reesa vespulae Milliron. I 1963 tok tekniker T. Sæther i AK: Ås et eksemplar som spesialisten Vladimir Kalik bestemte slik: '*Trogoderme vespulae* (Milliron) transferred from *Perimegatoma (= Megatoma)* V. Kalík det. 1965.' Ifølge Mroczkowski (1968) er arten overført til slekten *Reesa* Beal 1967, og oppgitt bare fra N.-Amerika (USA og Canada). Eksemplaret ble tatt i en klekkekasse, som inneholdt et stykke av en tørrgran.

Enkelteksemplarer har jeg tatt på vindu i min bolig på AK: Røa den 21/7 1966, 21/8 1967, 10/7, 21/7 og 27/8 1968 og 17/8 og 18/8 1969.

Konservator Lillehammer har forelagt meg rester av arten fra herbarier på Botanisk museum i Oslo funnet 8/11 og 21/12 1964 og 1/12 1965. Videre har F. C. Tandberg opplyst at arten er funnet i insektsamling på AK: Ås (larver 1966, klekt 1967) og i en bordskuffe i et hus i AK: Oslo juni 1968. Arten er meg bekjent ikke tidligere tatt i Europa.

Epuraea deubeli Rtt. Av denne meget sjeldne arten, som i Norge tidligere bare var kjent fra AK: Røa og NTi: Frosta, tok A. Bakke et eksemplar i en felle i AAi: Smeland.

Atomaria peltataeformis Sjöb. I den foran nevnte felle i Fø: Vaggatem ble et eksemplar av denne meget sjeldne arten tatt. Den er bare kjent fra noen få steder i Fennoskandia, i Norge fra Ø: Prestbakke i Idd, AK: Røa, TEy: Siljan og TRi: Nordreisa. Dyrene fra Ø og TEy ble også tatt i A. Bakkes feller, som alle stod nær utlagte bartrær, så det er sannsynlig at arten har noen tilknytning til slike trær.

Atomaria bella Rtt. I N.-Norge var denne arten tidligere bare kjent fra Nsi: Storjord, Saltdal og TRi: Sappen, Nordreisa. I Fø: Vaggatem ble et eksemplar tatt i den ovennevnte fellen.

Atomaria diluta Er. Arten var hos oss tidligere bare kjent fra omegnen av Oslo og Bergen. A. Bakke har tatt et eksemplar i en felle i AAy: Gjerstad.

Lathridius constrictus Gyll. Fra norsk område var arten tidligere bare kjent fra Oslotrakten. I Sverige er den funnet nord til Dalarna og i Finland synes den ikke å være kjent nordenfor polarsirkelen. Et eksemplar ble tatt i den foran nevnte fellen i Fø: Vaggatem.

Corticarina obfuscata A. Str. Tatt i et eksemplar i Fø: Vaggatem i den foran nevnte fellen. Mens arten i nabolandene er funnet opp til de nordligste deler, har den hos oss ikke vært kjent fra steder nordenfor STi: Strinda.

Som det framgår av det foran nevnte, ser det ut til at feller som de A. Bakke satte opp i Vaggatem, og som består av en rute satt i vertikal stilling over et kar med veske (Bakke 1968), gir utmerket utbytte. Således var av et materiale på ca. 100 biller fra fellen i Fø: Vaggatem 8 nye for Finnmark og av dem 3 nye for N.-Norge.

Scymnus apetzoides Capra & Fürsch. Den 11/6 1968 tok jeg ved håving på VE: Tjøme et *Scymnus* eksemplar (♀) som Fürsch har bestemt som en sannsynlig *apetzoides,* som tidligere ikke er kjent fra Norden.

Arten likner *apetzi* Muls., men skal ikke være så rund og ha meget kraftigere punkterte dekkvinger og svakere skuldre. Den viktigste forskjell ligger i bygningen av aedeagus, idet penis hos *apetzoides* er litt lengre, men hos *apetzi* kortere enn paramerene. Spermathecaen skal også være noe forskjellig hos de to artene. *S. apetzi* er oppgitt fra flere områder i Sverige og en lokalitet i S.-Finland, men ikke fra andre steder i Norden.

Rhopalodontus strandi Lohse. Det har vist seg at den arten som hos oss har vært holdt for *perforatus* Gyll. i virkeligheten er en ny art, som nylig er beskrevet som *strandi* (Lohse, 1969).

Palorus ratzeburgi Wissm. Av denne arten, som er ny for Norge, har L. Sømme den 12/6 1968 tatt 5 eksemplarer i kornavfall fra en silo i AK: Oslo.

Scolytus regulosus Ratz. Arten, som er ny for Norge, har R. Ihlebæk tatt i et eksemplar den 6/8 1968 i *Malus 'domestica'* i Ø: Vister, Tune.

Polygraphus subopacus Ths. Lokaliteten AK: Røa utgår.

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Nye funn av Lepidoptera i Norge

C. F. LÜHR

Lühr, C. F. 1970. Nye funn av Lepidoptera i Norge. *Norsk ent. Tidsskr. 17,* 123-124.

Several species of Lepidoptera are reported for the first time from various parts of Norway. The interesting distribution of *Mamestra furca* Ev. ssp. *Colletti* Sp. Schn. is pointed out. Beside four localities in Southern Norway this species has only been reported from East Asia.

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Nye funn av Lepidoptera er tidligere blitt meddelt av forfatteren (Lühr 1959—1968). Catalogue of the Lepidoptera of Norway (Opheim 1958, 1962) kan ytterligere suppleres med nedennevnte funn, som er nye for den landsdel hvor de er fanget. Forkortelser av geografisk inndeling ifølge Strand (1943).

Nomenklatur ifølge Nordström, Wahlgreen og Tullgren (1941).

On:*Euxoa tritici* L. 25. august 1962, *Calymnia trapezina* L. 25. august 1968, *Catocala fraxini* L. 4. september 1969, *Eupithecia subumbrata* Schiff. 30. juni 1968, *Opisthograptis luteolata* L. 20. juni 1968, *Spilosoma lubricipedum* L. 20. juni 1968. Samtlige funn på Fossberg i Lom.

Bø:*Trichiura crataegi* L. 13. august 1968, *Rhyacia cuprea* Schiff. 13 august 1968, *Elaphria morpheus* Hufn. 4. juli 1969, *Petilampa arcuosa* Haw. 5. junli 1969, *Larentia clavaria* Haw. 26. august 1969. Samtlige funn på Sætre i Hurum.

VE:*Bryophila divisa* Esp. 3. august 1969, *Agrotis vestigialis* Rott. 3. august 1969, *Triphaena subsequa* Schiff. 24. august 1968, *Scotogramma trifolii* Rott. 3. august 1969, *Monima gracilis* F. 10. mai 1969, *Monima populi* Strøm 12. mai 1969, *Calophasia lunula* Hufn. 3. august 1969, *Panolis flammea* Schiff. 17. mai 1969, *Palluperina testacea* Schiff. 10. august 1969, *Toxocampa craccae* Schiff. 3. august 1969, *Rivula sericealis* Scop. 3. august 1969, *Lobophora halterata* Hufn. 29. april 1968, *Eupithecia inturbata* Hb. 23. august 1968, *Diaphora mendica* Cl. 3. juni 1969. Samtlige funn på Narverød i Sem.

TEi:*Eurois occulta* L. 11. august 1969, *Parastichtis monoglypha* Hufn. 11. august 1969. Begge funn på Hegglandsgrend i Fyresdal.

VAy:*Lymantria monacha* L. 4. august 1969, *Euxoa tritici* L. 25. august 1967, *Scotogramma trifolii* Rott. 5. august 1969, *Sideridis conigera* Schiff. 9. august 1969, *Procus literosus* Haw. 6. august 1969, *Phytometra festucae* L. 9. august 1969, *Phytometra confusa* Steph. 4. august 1969. Samtlige funn på Repstad i Søgne.

Fø:*Hepialus sylvinus* L. 16. juli 1968, 4 km vest av Hesseng, ved Kirkenes, Sør-Varanger.

Mamestra furca Ev. ssp. *colletti* Sp. Schn.

Funn av *Mamestra furca* ssp. *colletti* (Noctuidae) i Norge har tidligere blitt omtalt av Schneider (1876) og Knaben (1951). Da denne art har en ganske eiendommelig utbredelse, kan det være av interesse å nevne litt om den.

I Norge er den tatt på følgende steder. On: Dombås 11. juni 1871 (R. Collett), Lom 18. august 1964 (C. F. Lühr leg., E. Urbahn det.). SFi: Skjolden 15. juli 1938 (N. Knaben). HOi: Ullensvang 12. juli 1962 (T. Edland).

Den er ikke fanget i Finland og Sverige. Forøvrig angir Staudinger & Rebel (1901, s. 160) at utbredelsen omfatter østlige Sibir, Tarbagatei (Altai), Uliassutai (Mongolia) Thian Schan (vest), Korla (Gobi), Kuku Noor (Tibet) og Norge. Bortsett fra Norge kan man vel si at utbredelsen er øst-asiatisk.

Den tidligere antakelse om at *M. furca colletti* er en fjellform ser, når man betrakter funnene i Skjolden og Ullensvang, neppe ut til å holde stikk. Utbredelsen nord-sør, fra Dombås i nord (62° 5′) til Ullensvang i sør (60° 20′) er også temmelig begrenset.

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Mottatt 10. januar 1970

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Additions and Corrections to the Norwegian Part of Catalogus Coleopterorum Fennoscandiae et Daniae

ANDREAS STRAND

Strand, A. 1970. Additions and Corrections to the Norwegian Part of Catalogus Coleopterorum Fennoscandiae et Daniae. *Norsk ent. Tidsskr. 17,* 125-145.

Nomenclatural corrections and distributional additions are given for the Norwegian part of Catalogus Coleopterorum Fennoscandiae et Daniae (Lindroth 1960).

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Catalogus Coleopterorum Fennoscandiae et Daniae, auctoribus Victor Hansen, Einar Klefbeck et Oscar Sjöberg, Gunnar Stenius, Andreas Strand, redigenda curavit Carl H. Lindroth, Lund, was published in 1960 (Lindroth 1960). Since then new finds necessitating additions to the distribution of a large number of species have been made, new species have been found, and many names have to be corrected.

In the Norwegian part of the catalogue, the alterations, in addition to those already mentioned on pages 466 and 467, are as follows:

Page 6

6. Read *Carabus arvensis* Hbst. and add VE. 20. *C. problematicus* Hbst.: TEy.
29. *Leistus rufescens* F.: TEi, SFi.
31. *Nebria brevicollis* F.: VE. 32. *N. gyllenhali* Schnh.: VE. 36. *N. salina* Frm.: MRy.
37. *Pelophila borealis* Payk.: HOi.
39. *Notiophilus biguttatus* F.: TEi. 41. *N. palustris* Dft.: TEy, MRy.

10

1. *N. pusillus* Wat.: VE.
4. *Trachypachys zetterstedti* Gyll.: Fö.
6. Read *Diacheila arctica* Gyll.
12. *Elaphrus uliginosus* F.: VE.
19. *Dyschirius globosus* Hbst.: MRy. 20. Read *D. nigricornis* Mtsch. *(helleni* J. Müll., *norvegicus* Munst.).
33. *Broscus cephalotes* L.: STi.
34. *Miscodera arctica* Payk.: HEs, HOi.
35. *Asaphidion flavipes* L.: VE. 36. *A. pallipes* Dft.: Ö.

14

4. *Bembidion bruxellense* Wesm.: MRy. 8. *B. dauricum* Mtsch.: HOi. 13. *B. fellmani* Mnh.: Bv, HOy, HOi, Nsy. 14. *B. femoratum* Sturm: HOi, Nsy, Nsi, TRy. 17. *B. gilvipes* Sturm: HEn. 19. *B. guttula* F.: Delete STi. 21. *B. hasti* Sahlb.: HOi, Nsy. 24. *B. hyperboraeorum* Munst.: Nsi, Nnö. 27. *B. lapponicum* Zett.: NTi. 36. *B. nitidulum* Mrsh.: Os.

18

2. *B. petrosum siebkei* J. Müll.: NTi. 3. *B. prasinum* Dft.: Nsy. 23. *B. virens* Gyll.: Nnö, TRy.
27. *Tachyta nana* Gyll.: Fö.
29. *Trechus discus* F.: NTi. 31. *T. micros* Hbst.: HEs. 32. *T. obtusus* Er.: HOi, NTi, Nsy. 35. *T. rubens* F.: VE, SFi.
37. *Aëpus marinus* Ström: Ö, STi.
39. *Pogonus luridipennis* Germ.: Ö.
42. *Patrobus septentrionis* Dej.: MRi.

22

2. *Perigona nigriceps* Dej.: AK.
6. *Chlaenius nigricornis* F.: TEy.
22. *Licinus depressus* Payk.: Ö, VE.
30. *Harpalus fuliginosus* Dft.. Fö.

26

1. *Harpalus quadripunctatus* Dej.: VE, Fö. 14. *H. winkleri* Schaub.: HOi.
23. *Acupalpus flavicollis* Sturm: HEs.
25. *Bradycellus collaris* Payk.: HOy, SFi. 27. *B. harpalinus* Serv.: VAy.: 29. *B. similis* Dej.: VE.
31. *Trichocellus cognatus* Gyll.: Os, Bv, TEy, HOy. 33. *T. placidus* Gyll.: Bv, SFi.
34. *Dichirotrichus pubescens* Payk. :TEy.
41. *Amara aenea* DeG.: HEs, On. 42. *A. alpina* Payk.: Nsy.

30

2. *A. apricaria* Payk.: TEi. 6. *A. communis* Panz.: TEi. 11. *A. cursitans* Zimm.: TEy. 12. *A. curta* Dej.: Os. 15. *A. eurynota* Panz.: VE, TEy, SFi. 17. *A. familiaris* Dft.: MRy. 23. *A. interstitialis* Dej.: HEs. 29. *A. municipalis* Dft.: Os, STi. NTi. 31. *A. nitida* Sturm: Ö. 32. *A. ovata* F.: Ö, HEs. 34. *A. praetermissa* Sahlb.: HOi. 35. *A. quenseli* Schnh.: AK. 40. *A. torrida* Ill.: NTy.

34

1. *Stomis pumicatus* Panz.: AK.
2. *Pterostichus adstrictus* Eschz.: TEi. 8. Read *P. versicolor* Sturm *(coerulescens* auct. nec L.). 17. *P. melanarius* Ill.: SFi, STi. 21. *P. niger* Schall.: Nnv. 25. *P. strenuus* Panz.: TEi.
30. *Calathus fuscipes* Gze.: Nsy. 32. *C. micropterus* Dft.: MRy, Nnö.
37. *Pristonychus terricola* Hbst.: HOy.
39. *Synuchus nivalis* Panz.: VE.
40. *Olisthopus rotundatus* Payk.: HOy.

38

2. *Agonum consimile* Gyll.: HOi, SFi, Nsi. 4. *A. dorsale* Pont.: VE, VAy. 7. *A. fuliginosum* Panz.: HOi. 8. *A. gracile* Gyll.: STi, Fö. 20. *A. munsteri* Hellén: TRi. 25. *A. sexpunctatum* L.: NTy, Fö. 26. *A. thoreyi* Dej.: VE. 28. *A. viduum* Panz.: MRy.
31. *Lebia crux-minor* L.: HEs, On, VE.
36. *Dromius agilis* F.: On. 37. *D. angustus* Brullé: VE. 38. *D. fenestratus* F.: SFi.

42

5. Read *D. quadrinotatus* Panz. and add HOy. 7. *D. sigma* Rossi: On.
16. *Cymindis vaporariorum* L.: HOi.
26. *Haliplus flavicollis* Sturm: HEs. 29. *H. fulvus* F.. Nsy. 31. *H. immaculatus* Gerh.: VE.

46

5. *Noterus crassicornis* Müll.: VE.
6. *Laccophilus hyalinus* DeG.: Bö. 7. *L. minutus* L.: Delete VAy. 8. *L. stroehmi* Th.: VAy.
17. *Coelambus novemlineatus* Steph.: VE.
26. *Hydroporus arcticus* Th.: HOy, HOi. 27. *H. brevis* F. Sahlb.: VE. 29. *H. dorsalis* F.: Fn. 30. *H. elongatulus* Sturm: VE. 34. *H. incognitus* Sharp: HOy. 37. *H. longicornis* Sharp: On, Bv, STi. 38. *H. melanarius* Sturm: HOy, HOi, STy, STi. 39. *H. melanocephalus* Mrsh.: HEs. 40. *H. memnonius* Nic.: Nsy.

50

7. *H. picicornis* J. Sahlb.: Bv. 10. *H. pubescens* Gyll.: VE. 15. *H. tartaricus* Lec.: VE, HOi. 18. *H. umbrosus* Gyll.: TEi.
23. *Deronectes alpinus* Payk.: STi, Nsy. 29. *D. halensis* F.: VE. 30. *D. latus* Steph.: AK.
36. *Platambus maculatus* L.: VE.

54

5. *Agabus congener* Thbg.: VE. 9. *A. guttatus* Payk.: VE. 12. *A. labiatus* Brahm: TRi. 20.

A. serricornis Payk.: Bv. 22. *A. solieri* Aubé.: Delete MRi. 26. *A. tarsatus* Zett.: Bv. 31. *A. wasastjernae* Sahlb.: Bv.

34. *Ilybius aenescens* Th.: TEy. 35. *I. angustior* Gyll.: Nnö. 39. *I. fuliginosus* F.: HOi, Nnö. 40. *I. guttiger* Gyll.: VE.

58

13. *Colymbetes paykulli* Er.: VE.
25. *Acilius sulcatus* L.: Nsy.
26. *Dytiscus circumcinctus* Ahr.: On. 29. *D. lapponicus* Gyll.: Nsy. 31. *D. marginalis* L.: HEn, HOi, MRi, NTi. 32. *D. semisulcatus* Müll.: VE.
34. *Gyrinus aeratus* Steph.: VE. 37. *G. marinus* Gyll.: Bö. 38. *G. minutus* F.: VE. 40. *G. opacus* Sahlb.: HOy.

62

2. *G. substriatus* Steph.: STi.
4. *Orectochilus villosus* Müll.: VE.
7. *Ochthebius bicolon* Germ.: VE.
15. *Hydraena britteni* Joy: TEi, HOy, MRi. 16. *H. gracilis* Germ.: MRy. 20. *H. riparia* Kug.: VE.
30. Read *Helophorus grandis* Ill. *(aquaticus* auct. nec L.) and delete all from TE to F. 31. Read *H. aquaticus* L. *(aequalis* Th.): Ö, AK, TEy, Ry, Ri, HOy, SFi, MRy, STy, STi, NTy, NTi, Nsy, Nsi, Nnv, TRy. 33. *H. erichsoni* Bach. Delete HEn, On, Fi, Fn, Fö. 37. *H. glacialis* Villa: HOy. 38. *H. granularis* L.: HEn.

66

1. Read *H. griseus* Hbst. *(semifulgens* auct. nec Rey) and add Bö. 2. *H. guttulus brevipalpis* Bed.: SFi. 3. *H. lapponicus* Th.: HEn, On, Fi, Fn, Fö. 4. *H. laticollis* Th.: On. 9a. *H. strandi* Angus i. l.: On, STi, Fn, Fö. 10. *H. strigifrons* Th.: On, TEy.
15. *Coelostoma orbiculare* F.: HEs.
17. *Sphaeridium lunatum* F.: Ö, VE. 18. *S. scarabaeoides* L.: TEi.
19. *Cercyon analis* Payk.: MRi. 26. *C. haemorrhoidalis* F.: MRi. 27. *C. impressus* Sturm: SFy, SFi, MRi. 28. *C. lateralis* Mrsh.: TEi, AAi, HOi, SFy. 31. *C. marinus* Th.: TRi. 32. *C. melanocephalus* L.: MRi. 33. *C. pygmaeus* Ill.: TEi, HOi, MRi. 35. *C. terminatus* Mrsh.: VE, SFi, MRi. 37. *C. unipunctatus* L.: MRi.
39. Read *Megasternum obscurum* Mrsh. *(boletophagum* auct. nec Mrsh.) and add VE.
41. *Cryptopleurum minutum* F.: TEi, MRi. 41a. *C. subtile* Sharp: AK, Ry.

70

2. *Hydrobius fuscipes* L.: MRy, MRi. 3. *H. rottenbergi* Gerh.: VE. 4. *H. subrotundus* Steph.: HEn.
6. *Anacaena globulus* Payk.: SFi. 7. *A. limbata* F.: HOi: MRi.
9. *Laccobius bipunctatus* F.: VE, TEi, MRi. 12. *L. striatulus* F.: VE.
13. Read *Helochares obscurus* Müll.
17. *Enochrus melanocephalus* Ol.: VE. 18. *E. ochropterus* Mrsh.: Ö, AK. 20. *E. testaceus* F.: VE.
21. *Cymbiodyta marginella* F.: VE.
22. *Chaetarthria seminulum* Hbst.: HEs.
30. Read *Necrophorus humator* Ol. and add VE, HOy. 32. *N. investigator* Zett.: VE, Nnv. 35. *N. vespilloides* Hbst.: Nsy.
37. *Necrodes litoralis* L.: HEs, VE.
40. *Thanatophilus rugosus* L.: Nnv, Fn.

74

3. *Oeceoptoma thoracica* L.: SFi.
6. Read *Xylodrepa quadripunctata* L.
10. *Phosphuga atrata* L.: TEi, MRi.
11. *Pteroloma forsstroemi* Gyll.: HOy, HOi, SFi, TRy.
14. *Leptinus testaceus* Müll.: AAy.
17. *Ptomaphagus medius* Rey: VE.
26. *Choleva angustata* F.: AK, VE. 27. *C. elongata* Payk.: VE. 28. *C. fagniezi* Jeann.: HOy, HOi. 29. *C. glauca* Britten: Delete

AK. 34. *C. septentrionis* Jeann.: HOy, HOi, SFi, Nsy.

39. *Catops alpinus* Gyll.: HOy, Nsy.

78

1. *C. coracinus* Kelln.: TEy, HOi, SFi. 2. *C. dorni* Rtt.: Ö, VE. 3. *C. fuliginosus* Er.: VE, Nsy, Nnv. 5. *C. fuscus* Panz.: VE, Nsy. 8. *C. longulus* Kelln.: TEy. 10. *C. morio* F.: TEy, AAy, SFi, Nsy. 12. *C. nigricans* Spence: HOy, Nnv. 13. *C. nigrita* Er.: VE, TEy, SFi. 15. *C. subfuscus* Kelln.: AAi. 16. *C. tristis* Panz.: VE, HOi, Nsy. 17. *C. westi* Krog.: VE. 18. Read *C. fumatus* Spence and add AK, HOy, HOi. 19. Read *C. watsoni* Spence: and add VE, AAi, MRy, Nnv. 20. Read *C. brevipalpis* Rtt. ssp. *colletti* Munst.

22. *Colon angulare* Er.: VE. 23. *C. appendiculatum* Sahlb.: On. 24. *C. arcticum* Munst.: On. 33. *C. latum* Kr.: Nsy. 37. *C. serripes* Sahlb.: HEs. 38. Read *C. viennense* Hbst.

39. *Triarthron maerkeli* Schm.: AAy.

82

1. *Hypnoidus hyperboreus* A. Str.: STi. 3 *H. perrisi* Frm.: On. 7. *H. spinipes* Gyll.: Ri, HOi, Nsy. 8. *H. strigosus* Schm.: STi.

12. *Liodes calcarata* Er.: VE. 13. *L. ciliaris* Schm.: VE. 15. *L. curta* Frm.: VE. 16. *L. dubia* Kug. AAy. 24 *L. obesa* Schm.: VE, Nsy. 29. Read *L. picea* Ill. and add Os 32. *L. rhaetica* Er.: Os. 35. *L. silesiaca* Kr.: AAy, AAi.

86

2. *Anisotoma castanea* Hbst.: Fö. 3. *A. glabra* Kug.: Nsy. 4. *A. humeralis* F.: VE, AAi. 5. *A. orbicularis* Hbst.: VE.

7. *Amphicyllis globiformis* Sahlb.: VE.

9. *Agathidium arcticum* Th.: TEy, HOi, NTi, Nsy. 10. *A. atrum* Payk.: HEs, HOy. 13. *A. confusum* Bris.: Ö, HEs, AAy, STi. 16. *A. laevigatum* Er.: HOy, SFi. 17. *A. mandibulare* Sturm: Bö, STi. 18 *A. marginatum* Sturm: TEy. 19. *A. nigrinum* Sturm: Nsi. 20. Read *A. nigripenne* Kug. and add Bö, VE, AAi. 24. *A. rotundatum* Gyll.: HOy, MRy, Fn. 25. *A. seminulum* L.: HOy, HOi. 26. *A. varians* Beck: VE.

29. Read *Clambus punctulum* Beck *(borealis* A. Str.) and add VE. 30. Read *C. nigrellus* Rtt. *(minutus* auct. nec Sturm) and add HEs, STi. 31. *C. pubescens* Redtb.: HEn. 31a. *C. radula* Endrödy-Younga: AK.

33. *Euthia linearis* Muls.: On.

90

1. *Neuraphes coronatus* J. Sahlb.: HOi.

8. *Stenichnus bicolor* Denny: HEn, VE, Nsy, Nsi.

16. *Euconnus fimetarius* Chd.: Ö.

24. *Scydmaenus tarsatus* Müll.: VE.

31. *Orthoperus atomus* Gyll.: VE, HOi. 35. *O. punctatus* Wank.: VE.

94

5. *Ptenidium myrmecophilum* Mtsch.: HEn, HOi. 6. *P. nitidum* Heer: TEy, HOi. 7. *P. punctatum* Gyll.: VE. 8. *P. pusillum* Gyll.: VE.

10. Read *Ptilium minutissimum* Ljungh and add TEy. 12. *P. exaratum* Allib.: HEs.

17. Read *Oligella nana* A. Str. 19. *O. foveolata* Allib.: On.

20. Read *Euryptilium saxonicum* Gillm. *(marginatum* auct. nec Aubé) and add HOy. 21. Read *E. gillmeisteri* Flach *(saxonicum* auct. nec Gillm.).

21a. *Nanoptilium brevicolle* Matth.: AK, 23. *P. fuscum* Er.: Ö, HEn, VE. 24. Read *Nanoptilium kunzei* Heer and add HEn, SFi.

26. *P. sahlbergi* Flach: VE. 28a. *P. wuesthoffi* Rossk.: AK.

35. Read *Ptinella limbata* Heer (f. aptera: *testacea* Heer).

37. *Pteryx suturalis* Heer: HEn, Nsy.

39. *Baeocrara variolosa* Muls.: HEn, Os, VE.

98

5. Delete i. l.
6. *Acrotrichis dispar* Matth.: HEs, VE. 7. *A. fascicularis* Hbst.: AAy, HOi, SFi. 8. *A. fratercula* Matth.: HOi. 9. *A. grandicollis* Mnh.: AAi, SFi. 9a. *A. insularis* Mäkl.: Ö, AK, AAy. 10. *A. intermedia* Gillm.: HEn AAi, MRy. 11. Read *A. pumila* Er. *(longicornis* auct, nec Mnh.) 15. Read *A. volans* Mtsch. *(parva* auct. nec Rossk., *fennica* Renk.) and add AK, Os, Bö. 16. Read *A. cognata* Matth. *(platonoffi* Renk.) and add AK, On, TRi, Fö. 16a. *A. rosskotheni* Sundt: Ry. 17. *A. rugulosa* Rossk.:HEn, VE, SFi. 18. *A. sericans* Heer: HEn. 19. *A. silvatica* Rossk.:HEn. 20. Read *A. sjoebergi* Sundt and add On. 21. *A. strandi* Sundt: Delete i l. 22. *A. suecica* Sundt: Delete i.l. and add AK. 23. *A. thoracica* Waltl: SFi.
28. *Scaphosoma boleti* Panz.: HEs, MRi. 29. *S. boreale* Lbl.: HEs, AAy.
33. *Micropeplus porcatus* F.: VE. 34. *M. tesserula* Curt.: STi, NTi, delete NTy.

102

1. *Megarthrus denticollis* Beck: VE, HOy, HOi. 2. *M. depressus* Payk.: TEy, HOi. 3. *M. fennicus* Laht.: HEs, AAy. 5. *M. nitidulus* Kr.: Os, Bö. 6. *M. sinuatocollis* Lac.: HEn, HOi, MRy, Nsy. 7. *M. strandi* Scheerp.: Bö, STi, NTi.
8. Read *Proteinus* n. sp. (according to Steel i. l. = *altaicus* auct. nec Rtt.). 9. Read *P. altaicus* Rtt. *(apicidens* Sjöb.). 10. *P. atomarius* Er.: SFi. 11. *P. brachypterus* F.: SFi, Nsy. 12. *P. crenulatus* Pand.: Os.
16. *Anthobium lapponicum* Mnh.: On, Bv, STi. 18. *A. minutum* F.: Bv, MRy. 19. *A. ophthalmicum* Payk.: VE, TEi, SFi, Nsy. 21. *A. sorbi* Gyll.: VE, Nsy, Fn. 22. *A. sorbicola* Y. Kangas: HOi.
24. *Acrulia inflata* Gyll.: VE, HOy, Nsy.
29. *Phyllodrepa clavigera* Luze: Bö, TRi, Fö. 32. *P. ioptera* Steph.: HOy, Nsy. 33. *P. linearis* Zett.: TEy, HOi. 37. *P. puberula* Bernh.: Ö, On, Bv, STi. 38. *P. pygmaea* Gyll.: AK, Bö.

106

1. *Omalium brevicolle* Th.: HEn, AAy. 2. *O. caesum* Gr.: Nsy. 3. *O. excavatum* Steph.: VE, MRy, Nsy. 4. *O. exiguum* Gyll.: VE, AAy, HOy. 10. *O. riparium* Th.: HOi. 11. *O. rivulare* Payk.: Nsy. 11a. *O. rugatum* Rey: Ö, HEs, On, Bö, VE, TEy, AAy, NTi. 13. *O. septentrionis* Th.: VE, HOi, MRy, Nsy.
14. *Phloeonomus lapponicus* Zett.: NTi. 15. *P. monilicornis* Gyll.: VE, HOy. 16. *P. pusillus* Gr.: VE, MRy, Fö. 19. *P. sjoebergi* A. Str.: NTi.
22. *Xylodromus depressus* Gr.: VE, SFi, Nsy.
30. *Phyllodrepoidea crenata* Gr.: HOy, STi.
31. *Deliphrum tectum* Payk.: HOi, Nsy.
32. *Lathrimaeum atrocephalum* Gyll.: SFi. 35. *L. unicolor* Mrsh.: Ö, SFi, MRy.
38. *Olophrum consimile* Gyll.: MRi. 39. *O. fuscum* Gr.: HEn, VE, HOy, SFi, Nsy. 41. *O. rotundicolle* Sahlb.: HOi, SFi.
42. *Arpedium brachypterum* Gr.: Nsy.

110

1. var. *gyllenhali* Sahlb.:AK, HEs. 3. Read *A. tenue* Lec. *(norvegicum* Munst.) and add HOi. 5. *A. quadrum* Gr.: Nsy.
6. *Acidota crenata* F.: VE, HOy, MRi, Nsy. 7. *A cruentata* Mnh.: MRy. 8. *A. quadrata* Zett.: HOi.
11. *Lesteva longelytrata* Gze.: VE, TEy, HOi. 12. *L. monticola* Kies.: Nsy. 13. *L. pubescens* Mnh.: SFi.
16. *Geodromicus plagiatus* F.: Delete VE, AAi, VAy, VAi, Ry, Ri, MRi, STy, NTy, Nsi. 16a. *G. nigrita* Müll.: HEs, Os, On, SFi.
18. *Anthophagus alpinus* F.: Nsy. 19. *A. caraboides* L.: Delete TEy. 20. *A. omalinus* Zett.: VE, MRy.
21. *Eudectes giraudi* Redtb.: STi.
22. *Coryphium angusticolle* Steph.: HEs, VE, HOy, HOi.
24. *Boreaphilus henningianus* Sahlb.: AAi, SFi, Nsy.
25. *Syntomium aenum* Müll.: VE, HOy, SFi.

114

11. *Trogophloeus obesus* Kies.: AAy. 13. *T. rivularis* Mtsch.: VE, 15. *T. subtilicornis* Roub.: STi.
17. *Aploderus caelatus* Gr.: SFi, Nsy, Nsi.
20. *Oxytelus complanatus* Er.: VE, 21. *O. fairmairei* Pand.: HEn. 23. *O. hamatus* Frm.: SFi. 32. *O. rugosus* F.: SFy. 36. *O. tetracarinatus* Block: On, SFi. 37. *O. tetratoma* Czwal.: VE.
38. *Platystethus alutaceus* Th.: VE. 39. *P. arenarius* Fourcr.: HOy.

118

1. *P. nodifrons* Sahlb.: HEs.
3. *Bledius arcticus* J. Sahlb.: HEs. 4. *B. arenarius* Payk.: HEs. 9. *B. crassicollis* Boisd.: STi. 12. *B. denticollis* Fauv.: HEs, On, STi, delete NTi. 20. *B. fracticornis* Payk.: VE, VAy, 22. *B. fuscipes* Rye: Ö, Nsy, TRi, Fi, Fn, Fö. 24. *B. larseni* V. Hns.: AK. 29. *B. opacus* Block: AK. 39. *B. tibialis* Heer: HEs. 40. *B. tricornis* Hbst: TEy.

122

2. *Oxyporus rufus* L.: On.
10. *Stenus biguttatus* L.: STi. 14. Read *S. comma* Lec. *(bipunctatatus* Er.) and add VE. 19. *S. canaliculatus* Gyll.: MRy. 21. Read *S. europaeus* Puthz *(cautus* auct. nec Er.). 22. *S. cicindeloides* Schall.: MRy. 23. *S. circularis* Gr.: VE. 25. Read *S. ludyi* Fauv. *(coarcticollis* auct. nec Epp.) and add SFi. 28. Read *S. problematicus* Kevan *(crassus* auct. nec Steph.) and add On. 29. Read *S. nanus* Steph. *(declaratus* Er.) 34. *S. flavipalpis* Th.: HOi, SFi. 36. *S. formicetorum* Mnh.: Nsi. 37. *S. fornicatus* Steph.: VE. 38. *S. fossulatus* Er.: VE. 39. *S. fulvicornis* Steph.: HEs, HEn. 41. *S. geniculatus* Gr.: SFi.

126

1. *S. gerhardti* Bck.: On.
2. Read *S. gibbicollis* J. Sahlb. ssp. *subarcticus* Popp. 8. *S. impressus* Germ.: On, SFi. 12. *S. labilis* Er.: AK. 18. *S. lustrator* Er.: HEn. 19. *S. melanarius* Steph.: MRy. 22. *S. nigritulus* Gyll.: HEn, STi. 23. *S. nitens* Steph.: VE. 24.: *S. nitidusculus* Steph.: HOi, SFi. 25. *S. niveus* Fauv.: Bv. 29. *S. palposus* Zett.: HEs. 30. *S. palustris* Er.: Hoi, SFi, MRy. 33. Read *S. brevipennis* Th. 34. *S. proditor* Er.: HEs, Bv, STi. 37. *S. pusillus* Steph.: VE.

130

1. *S. ruralis* Er.: NTi. 2. Read *S. crassus* Steph. *(salisburgensis* Bernh.) and add HEn. 9. *S. strandi* Bck.: HEn, HOi, Nsy. 11. *S. tarsalis* Ljungh: MRy.
15. *Euaesthetus bipunctatus* Ljungh: HEn.
18. *Paederus fuscipes* Curt.: AK, VE. 20. *P. riparius* L.: AAy.
23. *Astenus filiformis* Latr.: VE.
29. *Stilicus orbiculatus* Payk.: VE, Ry. 30. *S. rufipes* Germ.: AAi, HOi.
39. Read *Lithocharis nigriceps* Kr. and add VE. 42. Read *Lithocharis ochracea* Gr. and add VE.

134

8. *Lathrobium brunnipes* F.: VE, SFi, Nsy. 10. *L. elongatum* L.: VE. 13. *L. fovulum* Steph.: HEs. 14. *L. fulvipenne* Gr.: MRi, Fö. 15. *L. geminum* Kr.: SFi. 18. *L. multipunctatum* Gr.: VE, AAy. 23. *L. terminatum* Gr.: SFi, MRy.
25. *Cryptobium fracticorne* Payk.: TEi.
27. *Leptacinus formicetorum* Märk.: HOy. 28. *L. intermedius* Donisth.: Bö, VE, delete Bv. 29. *L. linearis* Gr.: MRi. 30a. *L. sulcifrons* Steph.: AK.
31. *Nudobius lentus* Gr.: VE.
32. Read *Gyrohypnus angustatus* Steph. and add MRi. 33. Read *G. atratus* Heer and add HOy, STi. 33a. *X. audrasi* Coiff. v.

strandi Coiff.: Ö, AK, Bö, VE. 33b. *Gyrohypnus fracticornis* Müll.: Ö, AK, HEs, Os, On, Bö, VE, VAy, Ry, HOy, NTi, TRi, Fö. 37. *X. linearis* Ol.: TEi. 38. *X. longiventris* Heer: Delete Ö, AK, Bö, AAi, Ry, Ri, 39. Read *Gyrohypnus punctulatus* Payk.: Ö, AK, HEs, HEn, Os, Bö, VE, TEy, AAy, VAy, Ry, HOi, SFy, SFi, NTi, Nsi, TRi, Fi.

138

1. *Baptolinus affinis* Payk.: VE, delete ?. 3. *B. pilicornis* Payk.: Nsy.
4. *Othius lapidicola* Kies.: VE, HOi. 5. *O. melanocephalus* Gr.: Nsy. 6. *O. myrmecophilus* Kies.: MRi, Nsy. 7. *O. punctulatus* Gze.: TEi.
11. Read *Erichsonius cinerascens* Gr. and add AAi, MRy.
12. *Philonthus addendus* Sharp: HOi. 13. *P. agilis* Gr.: TEy. 14. *P. albipes* Gr.: VE, SFi. 15. Read *Gabrius astutoides* A. Str. 16. *P. atratus* Gr.: MRy. 19. *P. carbonarius* Gyll.: AAi, HOy, HOi. 20. *P. cephalotes* Gr.: Os, AAy, HOi, SFi. 21. *P. chalceus* Steph.: TEy 26. *P. cruentatus* Gmel.: Delete ?. 28. *P. decorus* Gr.: TEi, SFi. 34. Read *Gabrius exspectatus* Smet. and add Bö.

142

3. *P. laminatus* Creutz.: TEi. 9. *P. marginatus* Ström: Nsy. 11. *P. nigrita* Gr.: SFi, MRy. 12. Read *Gabrius nigritulus* Gr. 13. *P. nigriventris* Th.: VE, Ri. 15. *P. nitidus* F.: VE, NTi. 15a. *P. parcus* Sharp: AK, On. 16. Read *Gabrius pennatus* Sharp and add Ry. 18. *P. politus* L.: AAi. 20. *P. puella* Nordm.: HEn, VE, HOy, HOi, SFy. 23. *P. rectangulus* Sharp: VE, STi, Nnö. 26. *P. sanguinolentus* Gr.: TEi. 31. Read *Gabrius splendidulus* Gr. 32. Read *Gabrius subnigritulus* Rtt. (*appendiculatus* Sharp) and add VE, HOi. 33. *P. subvirescens* Th.: NTi. 35. Read *Gabronthus thermarum* Aubé. 36. Read *Gabrius trossulus* Nordm. 38. *P. varians* Payk.: Nsy. 39. *P. varius* Gyll.: Fi. 40. Read *Gabrius velox* Sharp and add VE. 41. *P. ventralis* Gr.: Delete On. 42. Read *Gabrius vernalis* Gr. and add STi.

146

1. Read *Remus sericeus* Holme and add VE.
3. *Staphylinus aeneocephalus* DeG.: On, VE. 4. *S. ater* Gr.: AK. 5. *S. brunnipes* F.: TEy. 9. *S. dimidiaticornis* Gemm.: VAy. 10. *S. erythropterus* L.: VE. 12. *S. fulvipes* Scop.: Ö, VE. 14. *S. globulifer* Fourcr.: Os. 15. *S. latebricola* Gr.: HEs. 20. *S. pubescens* DeG.: VE.
28. *Creophilus maxillosus* L.: VE.
34. *Euryporus picipes* Payk.: SFi.
36. Read *Quedius sublimbatus* Mäkl. (*arcticus* Munst.). 37. *Q. aridulus* A. Jans.: AAy. 39. *Q. boopoides* Munst.: HOi, SFi, Nsy. 40. *Q. boops* Gr.: HOy.

150

2. *Q. cinctus* Payk.: VE. 4. *Q. curtipennis* Bernh.: VE. 7. *Q. fuliginosus* Gr.: HOi. 8. *Q. fulvicollis* Steph.: SFi. 13. *Q. laevigatus* Gyll.: AAi, SFi, Nnö. 15. *Q. limbatus* Heer: Nsy. 17. *Q. lucidulus* Er.: VE, HOy. 18. *Q. maritimus* J. Sahlb.: Delete Ö, AK, VAy, Ry, HOi. 20. *Q. maurus* Sahlb.: VE, HOi. 21. *Q. mesomelinus* Mrsh.: SFi. 29. Read *Q. molochinus* Gr. (*picipennis* Payk.). 30. *Q. picipes* Mnh.: HOi. 31. *Q. pseudolimbatus* A. Str.: STi. 35. *Q. scitus* Gr.: VE. 37. *Q. tenellus* Gr.: VE, AAy. 39. Read *Q. umbrinus* Er. (*maritimus* J. Sahlb.) and add VE, VAy, Ry.

154

6. *Trichophya pilicornis* Gyll.: HEs, TEy, VAy, HOi, MRy.
8. *Mycetoporus altaicus* Luze: HOi. 9. Read *M. erichsonanus* Fagel (*baudueri* auct. nec

Muls.) and add HOi, Nsy. 10a. *M. bimaculatus* Boisd. Lac. (*ruficornis* Kr.): AK, HEs, Os, On, Bö, TEy, AAy, Ry, STy, STi. NTi. 12. Read *M. brunneus* Mrsh. and add AAi, MRy. 13. *M. clavicornis* Steph.: VE.14a. *M. despectus* A. Str.: Ö, AK, HEs, Bö. 16. Read *M. baudueri* Muls. (*hellieseni* A. Str.). 19. *M. longicornis* Mäkl.: On. 20. *M. longulus* Mnh.: Delete Ö, HEs, Bö. 22. *M. maerkeli* Kr.: HOi. 23. *M. monticola* Fowl.: AK, HOi, SFi. 24. *M. mulsanti* Gglb.: HEs, HOi, SFi. 25. *M. niger* Frm.: On, HOi. 27. *M. punctus* Gyll.: HEs, HOi. 29. Delete *M. ruficornis* Kr. 30. *M. splendens* Mrsh.: Delete ?.

32. *Bryoporus cernuus* Gr.: VE.
33. Read *Bryophacis crassicornis* Mäkl. and add AK.
35. *Bryoporus rugipennis* Pand.: HOi, SFi.
37. *Bolitobius lunulatus* L.: VE, TEi.

158

1. *B. trinotatus* Er.: HEs, HOy, HOi.
3. *Bryocharis cingulata* Mnh.: TEi, HOy, TRy, Fö. 5. *B. inclinans* Gr.: HOi.
9. *Conosoma litoreum* L.: HOy, MRy. 9a. *C. marshami* Steph.: AK, HEs, Os, On, Bö, VE, TEy, HOi. 10a. *C. strigosum* J. Sahlb. (*stoeckli* Lok.): Ö, AK, Os, On, Bö, AAy, TRi, Fi. 11. Read *C. testaceum* F.: Ö, AK, HEs, Bö, VE, TEy, AAy, VAy, Ry.
13. *Tachyporus atriceps* Steph.: Read VE, AAy, VAy, Ry, Ri, HOy, HOi, SFy. 15. *T. corpulentus* J. Sahlb.: HEs, 18. *T. hypnorum* F.: HEn. 20. *T. nitidulus* F.: HEs. 21. *T. obscurellus* Zett.: HOi, SFi. 23. *T. pulchellus* Mnh.: Bv, Fn. 24. *T. pusillus* Gr.: VE, SFi. 24a. *T. quadriscopulatus* Pand.: Ö, AK, On, Bö, Bv, Ry, STy, NTi, TRy, Fi. 26. Read *Lamprinodes saginatus* Gr. 30. *T. transversalis* Gr.: SFi.
35. *Tachinus elongatus* Gyll.: SFi. 37. *T. laticollis* Gr.: VE, HOi. 40. *T. marginellus* F.: SFi. 41. *T. pallipes* Gr.: SFi. 42. *T. proximus* Kr.: VE.

162

2. *T. rufipennis* Gyll.: VE, TEy. 4. *T. subterraneus* L.: HEs, STi.
5. *Leucoparyphus silphoides* L.: VE, TEy.
13. *Hypocyptus pulicarius* Er.: HEn. 17. *H. tarsalis* Luze: VE.
18. *Deinopsis erosa* Steph.: HEn.
19. *Gymnusa brevicollis* Payk.: VE.
21. *Myllaena brevicornis* Matth.: Ri, HOi, Nsy. 23. Read. *M. kraatzi* Sharp (*gracilicornis* auct. nec Frm.) and add HOy, SFi. 27. *M. intermedia* Er.: MRy, STi. 28, Read *M. elongata* Matth. (*kraatzi* auct. nec Sharp). 29. *M. minuta* Gr.: SFi.
31. *Diglotta submarina* Frm.: STi.
32. *Oligota apicata* Er.: TEy. 36. *O. inflata* Mnh.: Ö. VE. 38. *O. muensteri* Bernh.: VAy. 40. *O. pusillima* Gr.: VAy.
41. *Hygronoma dimidiata* Gr.: HEs.
42. *Encephalus complicans* Westw.: VE.

166

1. *Gyrophaena affinis* Sahlb.: Nnv, TRi. 4. *G. congrua* Er.: VE. 5. *G. fasciata* Mrsh.: VE. 8. *G. joyi* Wend.: VE. 11. Read *G. angustata* Steph. (*manca* Er.). 14. *G. nana* Payk.: SFi, Nsy. 18. *G. poweri* Crotch: VE. 20. *G. pulchella* Heer: VE. 22. *G. strictula* Er.: VE, STi. 23. *G. williamsi* A Str.: On.
24. *Agaricochara latissima* Steph.: HOy.
24a. *Pseudomicrodota paganettii* Bernh. (*jelineki* Krasa, *Atheta flavicollis* Brd.): AK.
27. *Placusa atrata* Sahlb.: VE. 29. *P. depressa* Mäkl.: VE, Fö. 30. *P. incompleta* Sjöb.: STi, Fö. 31. *P. pumilio* Gr.: Delete AK.
33. *Homalota plana* Gyll.: VE.
40. *Leptusa norvegica* A. Str.: Os, VE. 41. *L. pulchella* Mnh.: SFi, Nsy.
42. Read *Pachygluta ruficollis* Er.

170

8. *Bolitochara lucida* Gr.: AAy, AAi, MRi. 9. *B. lunulata* Payk.: Nnö, Nnv, TRi, Fö.
11. *Autalia impressa* Ol.: Os. 12. *A. longicornis* Scheerp.: Ry. 13. *A. puncticollis* Sharp:

HEn, VE, HOy, SFi, Nsy. 14. *A. rivularis* Gr.: VE, TEi, HOy, HOi.

27. *Tachyusa leucopus* Mrsh.: VE.
30. Read *Gnypeta brincki* Palm: HEs, On, Bö, HOi, TRy, TRi, Fn, Fö. 32. *G. coerulea* Sahlb.: Nsy 33. *G. ripicola* Kies.: AK, 35. *G. sellmani* Brd.: Read On, TRi, Fi, Fn, Fö.
40. *Schistoglossa curtipennis* Sharp: HOi.

174

1. *S. viduata* Er.: HEs.
2. *Callicerus obscurus* Gr.: HOy.
3. *Amischa analis* Gr.: HOi. 6. Read *A. soror* Kr. *(simillima* Sharp, *sarsi* Munst.).
9. *Notothecta flavipes* Gr.: AAi.
13. Read *Halobrecta flavipes* Th. *(lysholmi* Bernh.) and add VE, HOy, HOi.
15. *Atheta acutangula* H. K. Hns.: Ö. 17. *A. allocera* Epp.: AK, Bö, 18. *A. alpestris* Heer: AK, VE, TEy, AAy, VAi, Ry, HOy. 19. Read *A.* (21) *liliputana* Bris. *(alpina* G. Bck.) and add SFi. 20. *A. altaica* Bernh.: HOi. 21. *A. amblystegii* Brd.: On. 22. *A. amicula* Steph.: VE, HOy, SFi 22a. *A.* (27) *amplicollis* M. & Rey: AK, HEs, Bö. 27. *A. arcana* Er.: Nsy. 29. Read *A.* (23) *celata* Er. *(arenicola* Th.) and add SFi, MRy, Nsy. 32. *A. atramentaria* Gyll.: MRy.

178

1. *A. boleticola* J. Sahlb.: VE. 2. *A. boletophila* Th.: AK. 3. *A. boreella* Brd.: AAi. 5. *A. britanniae* Bernh.: AAy, VAy, HOi. 6. *A. britteni* Joy: VE, Fn, 8. *A. brunneipennis* Th.: HOi, Fi. 9. *A cadaverina* Bris.: Nnv. 11. *A. castanoptera* Mnh.: VE. 12. *A cauta* Er.: Fö. 13. Read *A.* (23) *dadopora* Th. *(celata* auct. nec Er.). 14. *A. cinnamoptera* Th.: VE, AAi, HOy, HOi, Nsy. 17. *A. consanguinea* Epp.: AK, 18. *A. coriaria* Kr.: VE. 21. *A. crassicornis* F.: Nnv. 23. *A. cribripennis* J. Sahlb.: AK, HEn. 24. *A. currax* Kr.: TEi, SFi, 25. *A. debilis* Er.: HOy. 25a. *A.* (1) *debiloides* A. Str.: AK. 26. *A. deformis Kr.* STi. 29. *A. depressicollis* Fauv.: Nsy. 30. *A. diversa* Sharp: TEy. 31. *A. divisa* Märk.: HOy. 33. *A. dwinensis* Popp.: AK, AAi, SFi. 34. *A. ebenina* M. & Rey: HOi, Fn. 36. *A. elongatula* Gr.: TEi, HOy, MRy. 37. *A. euryptera* Steph.: MRy, Nsy. 38. *A. excellens* Kr.: VE, HOi, Nsy. 39. *A. excelsa* Bernh.: MRy.

182

1. *A. fallaciosa* Sharp: HOi. 3. Delete *A. flavicollis* Brd. 4. *A. frigida* J. Sahlb.: Nsy. 5. *A. fungi* Gr.: MRy. 9. *A. gagatina* Baudi: VE. 10. *A. glabricula* Th.: HEs. 13. *A. granigera* Kies.: HOi, SFi, Nsi. 14. *A. gregaria* Er.: VE. 16. *A. gyllenhali* Th.: VE. 19. *A. harwoodi* Will.: VE, Fn. 21. Read *A.* (24) *eremita* Rye *(hercynica* Renk.) and add Ö, VE. 22. *A. heymesi* Hubenth.: AAy, delete Bv. 24. *A. hygrobia* Th.: HEn, MRy, STi, NTi. 25. *A. hygrotopora* Kr.: HOy. 27. *A. hypnorum* Kies.: TEy, HOy. 28. *A. incognita* Sharp: TEy, AAi. 32. *A. insecta* Th.: VE, TEy, HOy, 33. *A. intermedia* Th.: HOi. 34. *A. ischnocera* Th.: VE, AAi, SFi. 35. *A. islandica* Kr.: HOi, SFi, Nsy, Nsi, Nnö, Nnv, TRy. 37. *A. laevana* M. & Rey: On, VE, AAi, HOy, HOi. 40. *A. lapponica* J. Sahlb.: Os. 41. *A. lateralis* Mnh.: AAy, AAi, SFi.

186

2. *A. laticollis* Steph.: VE, HOy. 4. *A. linearis* Gr.: VE, HOy. 8. *A. longicornis* Gr.: SFi, MRy. 10. *A. luridipennis* Mnh.: VE. 11. *A. luteipes* Er.: AK. 12. *A. macrocera* Th.: HOi, SFi. 13. *A. magniceps* J. Sahlb.: HOy. 14. *A. marcida* Er.: VE. 16. *A. melanaria* Mnh.: On. 17. *A. melanocera* Th.: MRy. 19. *A. microptera* Th.: AAi, HOy. 20. *A. monticola* Th.: VE. 22. *A. munsteri* Bernh.: HOi. 23. *A. muscorum*

Bris.: VE. 24. *A. myrmecobia* Kr.: SFi. 26. *A. nesslingi* Bernh.: AK, On. 27. *A. nidicola* Johans.: Os, Bö, VE. 29. *A. nigra* Kr.: HEs. 30. *A. nigricornis* Th.: VE, HOy, Nsy, Nnv. 32. *A. nigripes* Th.: VE, HOi, SFi. 37. *A. oblongiuscula* Sharp: Nsy. 39. *A. occulta* Er.: VE, HOy. 40. *A. orbata* Er.: TEy.

190

1. *A. orphana* Er.: SFi, 4. *A. palleola* Er.: Ö, Fö. 6a. *A.* (24) *pandionis* Scheerp.: Bö. 7. *A. paracrassicornis* Brd.: Os, VE. 8. *A. parapicipennis* Brd.: AK, VE, TEy, AAi, 9. *A. parvula* Mnh.: SFi. 12. *A. picipennis* Mnh.: Nsy. 13. *A. picipennoides* H. K. Hns.: SFi. 14. *A. picipes* Th.: VE.: 15. *A. pilicornis* Th.: HOy, Fn. 16. *A. piligera* J. Sahlb.: Fn. 21. *A. procera* Kr.: SFi. 23. *A. puncticollis* G. Bck.: On, VE. 26. *A. ripicola* H. K. Hns.: NTi.: 28. A. *scapularis* Sahlb.: VE. 29. *A. scotica* Ellim.: AK, HEs. 30. *A. setigera* Sharp: VE, HOi, SFi, 31. *A. silvicola* Kr.: HOi Nsi. 32. *A. sodalis* Er.: MRy. 33. *A. sordida* Mrsh.: HEs. 34. *A. sordidula* Er.: VE. 35. *A. sparre-schneideri* Munst.: HOi. 36. *A. spatuloides* G. Bck.: HEn. 38. *A. strandiella* Brd.: Ö, AK. 39. *A. subglabra* Sharp: On. 40. *A. subgrandis* Brd.: VE, TEy.

194

1. *A. subsinuata* Er.: VE, SFi, Nsy. 3. *A. subtilis* Scriba: AAi, MRy, Nsy. 4. Read *A.* (5) *septentrionum* G. Bck. *(subtilissima* auct. nec Kr.). 5. *A. sulcifrons* Steph.: HOy. 8. Read *A.* (24) *subquadrata* Sharp *(taxiceroides* Munst.). 12. *A. trinotata* Kr.: VE, HOy, MRy. 18. *A. xanthopus* Th.: VE.
20. Read *Pycnota paradoxa* M. & Rey *(nidorum* Th.) and add HEn, VE.
24. *Alianta incana* Er.: VE.
25. *Thamiaraea cinnamomea* Gr.: HEs.
27. *Astilbus canaliculatus* F.: SFi, MRy.
28. *Zyras cognatus* Märk.: VE. 30. *Z. funestus* Gr.: VE. 31. *Z. humeralis* Gr.: VE, AAy, Fö. 32. *Z. laticollis* Märk.: VE. 33. *Z. limbatus* Payk.: HEs.

198

2. *Phloeopora angustiformis* Baudi: VE, AAy
7. *Ilyobates nigricollis* Payk.: HEs, HEn, STi. 8. *I. subopacus* Palm: HEs.
16. *Acrostiba borealis* Th.: AK, HOi, MRy.
17a. *Chilopora crebrepunctata* A. Str.: STi.
24. *Ocalea picata* Steph.: HOi.
26. *Dinarda dentata* Gr.: VE, VAi.
29. Read *Meotica exilis* Er. *(exiliformis* Joy) 30. Read *M. apicalis* G. Bck. *(exilis* auct. nec Er., *clavata* G. Bck.) and add On, HOy. 32a. *M. lohsei* G. Bck. *(strandi* Scheerp.): AK.
37. Read *Ocyusa longitarsis* Th. *(hibernica* Rye). 38. *O. incrassata* M. & Rey: HOy, HOi. 41. *O. nivicola* Th.: Nsy.

202

1. *O. tullgreni* Palm: AK.
4. *Hygropora cunctans* Er.: AK.
6. *Oxypoda abdominalis* Mnh.: HEs. 7. *O. advena* Mäkl.: HEs. 8. *O. alternans* Gr: AAi. 9. *O. amoena* Frm.: VE, STi. 10. *O. annularis* Mnh.: SFi. 11. *O. bicolor* M. & Rey: HOi. 15. *O. exoleta* Er.: VE. 17. *O. funebris* Kr.: VE, HOi. 18. *O. haemorrhoa* Mnh.: HOi. 19. *O. hansseni* A. Str.: Bö, TEy, AAi, Fö. 21. *O. islandica* Kr.: Nsy. 25. *O. lucens* M. & Rey: HOi. 26. *O. lugubris* Kr.: AK, SFi. 27. *O.* nigricornis Mtsch.: HOi, Nsy. 28. *O. opaca* Gr.: MRy. 31. *O. procerula* Mnh.: VE, HOy, HOi, 32. *O. recondita* Kr.: TEy. 37. *O. skalitzkyi* Bernh.: HOi, SFi. 38. *O. soror* Th.: HOi, SFi. 39. *O. spectabilis* Märk.: HOy.

206

1. *O. togata* Er.: VE, TEy. 2. *O. umbrata* Gyll.: TEy, SFi, MRy, Nsy. 3. *O. vicina* Kr.: HEs.

7. *Stichoglossa forticornis* A. Str.: AK. 8. *S. prolixa* Gr.: TEy, HOy, MRy.
19. *Microglotta nidicola* Frm.: VE. 20 *M. picipennis* Gyll.: Os, Bö. 21. *M. pulla* Gyll.: AAy.
22. *Tinotus morion* Gr.: VE, AAi, HOi.
25. *Aleochara bipustulata* L.: TEy, TEi, SFi, Nsy. 26. *A. brevipennis* Gr.: Delete SFi. 29. *A. curtula* Gze.: TEi, HOy. 30. Read *A. albovillosa* Bernh. *(diversa* auct. nec J. Sahlb.) and add VE, HOi, 30a. *A. diversa* J. Sahlb.: HEs. 34. *A. inconspicua* Aubé.: VE, HOi. 37. *A. lanuginosa* Gr.: AAi, MRy, Nsy. 38. *A. lygaea* Kr.: Ö, TEy. 39. *A. moerens* Gyll.: VE, HOi, Nsy. 41. *A. obscurella* Gr.: VE. 41a. *A. peeziana* Lohse: Fö.

210

3. *A. sanguinea* L.: HEs, VE. 4. *A. spadicea* Er.: VE. 6a. *A. stichai* Likovsky: AK, Bö. 8. *A. verna* Say: Delete Ö. 9. *A. villosa* Mnh.: VE.
13. Read *Euplectus bescidicus* Rtt. *(bohemicus* Mach.). 17. Read *E. fauveli* Guillb. *(falsus* Bed., *tomlini* Joy). 18. *E. karsteni* Reich.: SFi, Nsi. 19. *E. nanus* Reich.: Ry. 22. *E. sanguineus* Denny: SFi.
25. *Bibloporus bicolor* Denny: HOy, Nsy. 26. Read *B. minutus* Raffr. *(hoeglundi* Palm).
38. Read *B. hamatica* Reich. and add VE.

214

2. *B. helferi* Schm.-G.: NTi.
4. *Reichenbachia juncorum* Leach: Ry.
7. Read *Bryaxis bulbifer* Reich. and add Bv, SFi. 10. Read *B. puncticollis* Denny *(validus* Aubé, *gracilipes* Raffr.): Ö, AK, On, Bö, VE, TEy, AAy, VAy, Ry, Ri, HOy, HOi, SFy, SFi, STi, NTi, Nsi, Nnv, TRy, TRi. 11. Read *B. burelli* Denny.
17. Read *Tyrus sanguineus* L. *(mucronatus* Panz.) and add VAy.
19. *Claviger testaceus* Preyssel.: VE, Ry.
27. *Plegaderus saucius* Er.: AK. 28. *P. vulneratus* Panz.: AAy, Fö.

218

9. *Saprinus rugifrons* Payk.: STi. 10. *S. semistriatus* Scriba: NTi.
13. *Gnathoncus buyssoni* Auzat: HEs, Os, VE. 15. *G. nanus* Scriba: Os, VE, AAi, HOy. 17. Read *G. schmidti* Rtt. *(nidicola* Joy, *punctator* Reich,).
18. *Myrmetes piceus* Payk.: TEy, AAy, AAi, Nsy.
19. *Dendrophilus punctatus* Hbst.: HOy.
21. *Carcinops 14-striata* Steph.: Bö.
29. *Platysoma lineare* Er.: TEy.
34. *Hister cadaverinus* Hoffm.: VE, SFi. 37. *H. 12-striatus* Schrk.: VE. 40. *H. merdarius* Hoffm.: VE, HOy, delete TEy.

222

2. Read *H. purpurascens* Hbst. 8. *H. unicolor* L.: Nsy.
11. *Dictyopterus affinis* Payk.: VE. 12. *D. aurora* Hbst.: VAy.
15. *Platycis minuta* F.: STi.
16. *Lygistopterus sanguinens* L.: Fö.
19. *Podabrus alpinus* Payk.: Nsy. 21. *P. obscuripes* J. Sahlb.: On.
26. *Cantharis figurata* Mnh.: MRy. 30. *C. livida* L.: Bö, Nsy. 34. *C. paludosa* Fall.: HOy, MRy, Nsy. 35. *C. pellucida* F.: MRi.

226

1. *C. quadripunctata* Müll.: TEy.
6. *Rhagonycha atra* L.: VE, MRy. 7. *R. elongata* Fall.: AAi. 10. *R. fulva* Scop.: Ö. 13 *R lutea* Müll.: VE. 15. *R. testacea* L.: Bv, HOy, MRy.
17. *Podistra pilosa* Payk.: SFi. 18. *P. rufotestacea* Letzn.: VE, SFy, SFi.
20. *Malthinus biguttulus* Payk.: AAi. 22. *M. flaveolus* Payk,: VE. 23. *M. frontalis* Mrsh.: HOi, SFi.
24. *Malthodes brevicollis* Payk.: VE, AAi. 27. *M. fibulatus* Kies.: HOy. 28. *M. flavoguttatus* Kies.: Nsy. 29. *M. fuscus* Waltl: SFi. 30. *M. guttifer* Kies.: VE, delete Ry.

31. *M. marginatus* Latr.: HEs. 34. *M. mysticus* Kies.: SFi. 35. *M. pumilus* Bréb.: HOy. 36. *M. spathifer* Kies.: VE, TEy, MRy, STi.

230

7. *Malachius aeneus* L.: Bv. 10. *M. viridis* F.: Os.
10a. *Anthocomus bipunctatus* Harrer: AK, TEy.
19. *Dasytes aerosus* Kies.: AAy. 24. *D. obscurus* Gyll.: VE.
28. *Dolichosoma lineare* Rossi: Ö.
32. *Tillus elongatus* L.: AAy.
35. *Thanasiumus formicarius* L.: TRi. 36. *T. rufipes* Brahm: Fö.

234

7. *Necrobia violacea* L.: TEi.
9. *Hylecoetus dermestoides* L.: Ö, HOi, Nsy.
12. *Adelocera conspersa* Gyll.: Fö.
17. *Elater balteatus L.*: AAi. 32. *E. sanguineus* L.: TEi.

238

2. Read *Cryptohypnus algidus* J. Sahlb. and add HOi. 3. Read *Cryptohypnus arcticus* Cand. 4. Read *Hypolithus consobrinus* Muls. Guill. and add HEs, STi. 5. Read *Cryptohypnus dermestoides* Hbst. 6. Read *Hypolithus hyperboreus* Gyll. and add Nsy. 7. Read *Cryptohypnus maritimus* Curt. and add Nsi. 8. Read *C. pulchellus* L. 11. Read *Hypolithus riparius* F. 12. Read *Hypolithus rivularius* Gyll.
24. *Melanotus rufipes* Hbst.: SFi, MRi.
30. *Harminius undulatus* DeG.: AK, Nsy.
31. *Athous haemorrhoidalis* F.: On. 34 . *A. niger* L.: SFy.
36. *A. subfuscus* Müll.: AAi, SFy.

242

3. *Corymbites cupreus* F.: Delete Ri. 4. *C. cupreus* var. *aeruginosus* F.: Ry, Ri. 6. *C. impressus* F.: AAi.
13. *Prosternon tessellatum* L.: SFy, MRi, Nsy.
14. *Orithales serraticornis* Payk.: HEn.
15. *Hypoganus cinctus* Payk.: VE.
18. *Agriotes aterrimus* L.: HOy.
24. *Dolopius marginatus* L.: Bv, AAi, SFi.
31. *Melasis buprestoides* L.: VAy.
34. *Dirrhagus lepidus* Rosh.: TEy. 35. *D. pygmaeus* F.: VE.

246

1. *Hypocoelus procerulus* Mnh.: AK.
4. *Throscus carinifrons* Bonv.: VE, AAi.
23. Read *Phaenops cyanea* F.
25. Delete *(submontana* Obenb.). 25a. *Anthaxia godeti* Cast. et Gory *(submontana* Obenb.): Ö, AK, On, Bö, Bv, TEy, TEi, AAy, VAy.
26. *Chrysobothris affinis* F.: TEy.

250

7. *Agrilus sulcicollis* Lac.: VE. 8. *A. viridis* L.: TEy, TEi, Fö.
12. Read *Habroloma nana* Payk.
18. *Helodes minuta* L.: VE, TEy.
19. *Microcara testacea* L.: VE, MRy.
20. *Cyphon coarctatus* Payk.: HEs, VE. 22. *C. kongsbergensis* Munst.: VE, HOi. 23. *C. ochraceus* Steph.: VE, HOy. 24. *C. padi* L.: MRy. 25. *C. palustris* Th.: MRy. 29. *C. variabilis* Thbg.: MRy.

254

2. *Dryops auriculatus* Geoffr.: VE. 6. *D. nitidulus* Heer: STi, NTi. 7. *D. similaris* Bollow: VE.
9. Read *Elmis aenea* Müll. instead of *Helmis maugei* ssp. *megerlei* Dft.
12. Read *Oulimnius tuberculatus* Müll. and add VE.
16. Read *Limnius volckmari* Panz.
27. Read *Dermestes gyllenhali* Cast. *(atomarius* Er.) and delete Ö, AK, Bö, VE, TEy. 28. Read *D. ater* DeG. *(cadaverinus* F.). 29. *D. frischi* Kug.: Bö, MRy. 31. *D. laniarius* Ill.: AAy. 32. *D. lardarius* L.: Nsy. 33. *D. murinus* L.: Fö.

258

1a. *D. szekessyi* Kalik: Ö, AK, Bö, VE, TEy. 3. Read *D. maculatus* DeG. (*vulpinus* F.).

4. Read *Attagenus fasciatus* Thbg. (*gloriosae* F.) and add AK. 6. Read *A. unicolor* Brahm (*piceus* Ol.) and add AK.

10. *Megatoma undata* L.: HOy.

18a. *Reesa vespulae* Mill.: AK.

21. *Anthrenus museorum* L.: TRy, TRi. 23. *A. scrophulariae* L. ssp. *suecicus* Palm: VE, TEi.

31. *Simplocaria metallica* Sturm: HOi. 32. *S. semistriata* F.: VE, Nsy.

36. *Cytilus auricomus* Dft.: HOy, TRi. 37. *C. sericeus* Forst.: MRy.

262

1. *Byrrhus arietinus* Steff.: AK, HOy, HOi, SFi, Nsy. 3. *B. pilula* L.: STi. 4. *B. pustulatus* Forst.: HOi.

6. *Syncalypta cyclolepidia* Munst.: HOi.

11. *Sphaerites glabratus* F.: AAi, HOi.

12. *Nemosoma elongatum* L.: Ö, VE, AAy.

23. *Byturus tomentosus* F.: SFy, Nsy, TRi.

25. *Cateretes pedicularius* L.: TEi.

30. Read *Brachypterolus cornelii* Spornraft (*linariae* Corn.).

32. *Pria dulcamarae* Scop.: Ö, VE.

266

8. *Meligethes coeruleovirens* Först.: Os, On, Bö. 17. Read *M. denticulatus* Heer (*hebes* Er.) and add HOy. 20. Read *M. flavimanus* Steph. (*lumbaris* Sturm). 22. *M. morosus* Er.: AK, TEy. 26. *M. ovatus* Sturm: HEs. 27. Read *M. viduatus* Heer. 28. Read *M. nigrescens* Steph. (*picipes* Sturm). 31. *M. subaeneus* Sturm: AK. 32. *M. subrugosus* Gyll.: HOi.

37. Read *Carpophilus ligneus* Murray (*decipiens* Horn) and add VAy(i). 39. *C. hemipterus* L.: VE(i).

41. *Nitidula bipunctata* L.: HOi.

270

2. *Omosita colon* L.: MRi. 3. *O. depressa* L.: VE. 4. *O. discoidea* F.: VE.

6. *Epuraea adumbrata* Mnh.: HEn. 9. *E. binotata* Rtt.: TEy, AAi. *10. E. boreella* Zett.: AAy. 15. *E. depressa* Ill.: AAi, MRy. 16. *E. deubeli* Rtt.: AAi. 18. *E. florea* Er.: VE. 20.: *E. guttata* Ol.: VE. 21. Read *E. fussi* Rtt. (*interpecta* Sjöb.). 22. *E. laeviuscula* Gyll.: TEy. 23. *E. limbata* F.: VE. 28. *E. melina* Sturm: HOy, MRy. 29. *E. muehli* Rtt.: TEy, AAy, AAi. 30. *E. neglecta* Heer: VE. 31. *E. oblonga* Hbst.: TEy, STi. 32. *E. opalizans* J. Sahlb.: HEs. 33. *E. placida* Mäkl.: TEy, AAy, Nsy. 34. *E. pusilla* Ill.: AAi, MRy, Nsy. 35. *E. pygmaea* Gyll.: TEy, AAi, HOy. 37. *E. rufomarginata* Steph.: TEy, AAy. 38. *E. silacea* Hbst.: HEn. 40. *E. terminalis* Mnh.: HOi. 41. *E. thoracica* Tourn.: Ö, TEy. 42. *E. unicolor* Ol.: VE.

274

7. *Cychramus luteus* F.: AAi, MRi. 8. Read *C. variegatus* Hbst. (*quadripunctatus* Hbst.) and add VE.

9. *Pocadius ferrugineus* F.: VE.

13. *Cryptarcha strigata* F.: VE.

14. *Librodor hortensis* Fourcr.: HEn.

16. *Glischrochilus quadripunctatus* L.: SFy, MRy, MRi, Fö.

17. *Pityophagus ferrugineus* L.: MRy, MRi.

22. *Rhizophagus cribratus* Gyll.: NTi. 23. *R. depressus* F.: VE, SFy, MRi, STy. 24. *R. dispar* Payk.: Nsy. 25. *R. ferrugineus* Payk.: VE, SFi, Fö. 26. *R. grandis* Gyll.: On. 27. *R. nitidulus* F.: VE, HOy, STi, Nsy, Nsi. 29. *R. parvulus* Payk.: VE. 31. *R. picipes* Ol.: AK.

33. *Monotoma angusticollis* Gyll.: VE. 34. *M. bicolor* Villa: VE. 35. *M. brevicollis* Aubé: VE. 36. Read *M. conicicollis* Guér. 37. *M. longicollis* Gyll.: VE, AAy, AAi, SFy, SFi, MRi.

278

1. *M. picipes* Hbst.: SFi.
9. *Oryzaephilus mercator* Fauv.: STi(i), Fv(i). 10. *O. surinamensis* L.: TRy(i).
13. *Silvanoprus fagi* Guér.: VE.
16. *Dendrophagus crenatus* Payk.: MRi.
21. *Pediacus fuscus* Er.: Nnö.
24. *Laemophloeus abietis* Wank.: VE. 25. *L. alternans* Er.: VE, TEy. 33. *L. ferrugineus* Steph.: VE(i), TEy(i), STy(i). 37. *L. turcicus* Grouv.: Ö(i), AK(i), VE(i), TEy(i), HOy(i).

282

1. *Tritoma bipustulata* F.: VE, AAy.
2. *Triplax aenea* Schall.: VE, AAy. 3. *T. rufipes* F.: Ö, VE.
6. *Dacne bipustulata* Thbg.: VE, STi.
12. *Telmatophilus schoenherri* Gyll.: AK.
16. *Henoticus serratus* Gyll.: Fö.
17. *Pteryngium crenatum* F.: AAy.
18. *Micrambe abietis* Payk.: AAi. 21. *M. villosa* Heer: Ve.
23. *Cryptophagus acutangulus* Gyll.: VE. 24. Read *C. laticollis* Lucas (*affinis* Sturm). 25. Read *C. confertus* Cas. (*archangelicus* J. Sahlb.). 26. *C. badius* Sturm: HEn, SFi, MRy, MRi. 31. Read *C. dentatus* Hbst. (*fumatus* Mrsh.). 32. *C. distinguendus* Sturm: VE. 33. *C. dorsalis* Sahlb.: AAi. 34. Read *C. fallax* Balf.-Browne (*fumatus* auct. nec Mrsh.) and add Ry. 35. *C. fuscicornis* Sturm: VE.

286

1. *C. lapponicus* Gyll.: MRy, Fö. 2. *C. lycoperdi* Scop.: AK, VE, VAy. 3. *C. lysholmi* Munst.: HEn, On. 3a. *C. micaceus* Rey: AK, VE. 5. Read *C. angustus* Gglb. (*parallelus* Th. nec Bris.) and add TEy, AAy, AAi. 6. *pilosus* Gyll.: Bv, VE, AAy, AAi. 7. *C. plagiatus* Popp.: HEn. 10. *C. pseudodentatus* Bruce: HEs, VE, AAi, SFi, MRy, MRi. 11. *C. pubescens* Sturm: Ö, VE. 12. *C. quercinus* Kr.: HEn, Bö, TRi. 13. *C. saginatus* Sturm: On, VE, 14. *C. scanicus* L.: MRy, MRi. 16. *C. setulosus* Sturm: HOi, MRi. 17. *C. subdepressus* Gyll.: VAy.
23. *Antherophagus nigricornis* F.: VE, AAi. 24. *A. pallens* F.: VE, Nsy.
25. *Caenoscelis ferruginea* Sahlb.: VE. 26. Read *C. fleischeri* Rtt. (*grandis* Th.) and add HOi.
28. *Atomaria affinis* Sahlb.: Bv. 30. *A. analis* Er. ssp. *borealis* Sjöb.: AAi, SFi. 31. *A. apicalis* Er.: SFi, Nsy. 32. *A. atrata* Rtt.: On, VE, TEy, HOi, STi. 36. *A. bella* Rtt.: VE, AAy, Fö. 37. *A. berolinensis* Kr.: HEn, VE. 42. *A. fuscata* Schnh. :VE, Fn.

290

1. *A. fuscicollis* Mnh.: HOi, MRy. 2. *A. fuscipes* Gyll.: VE, AAi. Fö. 4. Read *A. rhenana* Kr. (*godarti* Guill., *elevata* Allen). 6. *A. hislopi* Woll.: AK. 7. *A. impressa* Er.: VE. 8. *A. lewisi* Rtt.: Bö, VE, AAy, HOy. 10. *A. mesomelaena* Hbst.: VE. 11. *A. morio* Kol.: AAy. 12. *A. munda* Er.: VE. 13. Read *A. nigripennis* Payk. 16. *A. ornata* Heer: VE, TEy, TEi, AAi. 17. *A. peltata* Kr.: HEn, Bv, VE, STi. 18. *A. peltataeformis* Sjöb.: TEy, Fö. 20. *A. procerula* Er.: TEy TEi, MRy, NTi. 21. *A. prolixa* Er.: Ö, TEy, SFy, Fi. 21a. *A. pseudaffinis* C. Johns. & A. Str.: AK, TRi. 22. *A. puncticollis* Th.: STi. 26. *A. ruficornis* Mrsh.: SFi, Nsy, Nsi. 28. *A. semitestacea* Rtt.: Nsy. 30a. *A. strandi* C. Johns.: AK. 33. *A. turgida* Er.: VE, AAy, AAi. 35. *A. wollastoni* Sharp: VE. 36. *A. zetterstedti* Zett.: VE.
39. Read *Phalacrus coruscus* Panz. (*fimetarius* auct.).

294

2. *P. substriatus* Gyll.: VE, MRy.
4. *Olibrus aeneus* F.: VE. 10. Read *O. norvegicus* Munst. (*flavicornis* auct. nec Sturm).
15. *Stilbus testaceus* Panz.: VE.
22. *Lathridius bergrothi* Rtt.: HEn, Os, VE.

23. *L. constrictus* Gyll.: Fö. 25. *L. lardarius* DeG.: VE. 26. *L. nodifer* Westw.: HOy, SFi, MRy, STi. 27. Read *L. australicus* Belon (*norvegicus* A. Str.). 28. *L. pandellei* Bris.: TEy, AAy. 29. *L. rugicollis* Ol.: VE, TEy, TEi, STi.
32. *Enicmus anthracinus* Mnh.: NTi, Fö.

298

1. *E. fungicola* Th.: SFi. 3. *E. histrio* Joy: VE. 6. *E. nidicola* Palm: NTi. 8. *E. pseudominutus* A. Str.: HEn, VE, Nsy, Fö. 9. *E. rugosus* Hbst.: HEs, AAy, AAi, TRi. 10. *E. testaceus* Steph.: AAy. 11. *E. transversus* Ol.: VE, VAy.
12. *Cartodere elongata* Curt.: VE, STy. 13. *C. filiformis* Gyll.: VE. 14. *C. filum* Aubé: Ö, HOy.
17. *Corticaria abietum* Mtsch.: AAy, STi. 22. Read *C. polypori* J. Sahlb. (*eppelsheimi* Rtt. 1886). 25. *C. fulva* Com.: VE. 28. *C. interstitialis* Mnh. HEn. 30. Read *C. lateritia* Mnh. (*eppelsheimi* Rtt. 1875). 31. *C. linearis* Payk.: AAy. 32. *C. longicollis* Zett.: Fn. 37. *C. pubescens* Gyll.: HEn, VE.

302

1. *Corticarina fuscula* Gyll.: MRi. 2. *C. gibbosa* Hbst.: MRy. 4. *C. latipennis* J. Sahlb.: HEn. 5. *C. obfuscata* A. Str.: STi, Fö.
8. *Melanophthalma transversalis* Gyll.: TEy.
12. *Mycetophagus atomarius* F.: TEy. 17. *M. populi* F.: VE.
20. *Typhaea stercorea* L.: TEy, HOy.
26. *Synchita humeralis* F.: VE.

306

1. *Cerylon ferrugineum* Steph.: HOy, Nsy. 2. *C. histeroides* F.: Nnö.
6. *Mycetaea hirta* Mrsh.: TEy, HOy, SFi.
9. *Liesthes seminigra* Gyll.: AK.
11. *Lycoperdina succincta* L.: Ö, VE.
12. *Mycetina cruciata* Schall.: TEy.
13. *Endomychus coccineus* L.: MRi, Nsy.
14. *Subcoccinella 24-punctata* L.: VE.
16. *Coccidula rufa* Hbst.: MRy. 17. *C. scutellata* Hbst.: VE.
20a. *Scymnus apetzoides* Capra et Fürsch: VE?. 21. *S. ater* Kug.: TEy. 22. *S. auritus* Thbg.: Bö. 24. *S. bisignatus* Boh.: NTi. 30a. *S. limonii* Donisth.: Ö, AK. 31. *S. nigrinus* Kug.: HOy. 32. Read *Stethorus punctillum* Weise. 33. Delete (incl. *limonii* Donisth.) and Ö, AK. 36. Read *S. mimulus* Capra et Fürsch (*rufipes* auct. nec F.). 37. *S. suturalis* Thbg. AAi, HOi, MRi.

310

2 Read *S. jakowlewi* Weise (*triangularis* J. Sahlb.).
3. Read *Hyperaspis pseudopustulata* Muls. (*reppensis* auct. nec Hbst.).
5. *Hippodamia septemmaculata* DeG.: MRy.
7. *Adonia variegata* Gze.: Os.
8. *Anisosticta 19-punctata* L.: HEs, MRy.
10. *Semiadalia notata* Laich.: HEs.
11. *Aphidecta obliterata* L.: HOy, HOi, MRy.
13. *Adalia bipunctata* L.: Nsy.
21. *Coccinella trifasciata* L.: Nsy. 22. *C. 11-punctata* L.: TEy.
23. *Coccinula 14-pustulata* L.: On, Ry.
29. *Myrrha 18-guttata* L.: VE.
31. *Thea 22-punctata* L.: TEi.
32. *Calvia 14-guttata* L.: Nsy.
35. Read *Neomysia oblongoguttata* L. and add TEi.
36. *Anatis ocellata* L.: STi.
39. *Chilocorus renipustulatus* Scriba: HEn, On, TEi.

314

1. *Sphindus dubius* Gyll.: AAy.
2. *Aspidiphorus orbiculatus* Gyll.: VE, AAy.
4. *Cis alni* Gyll.: Os, SFi. 5. *C. bidentatus* Ol.: SFi, MRi, Fn. 6. *C. boleti* Scop.: Nsy, Nnö. 7. *C. comptus* Gyll.: Fn. 10. *C. festivus* Panz.: HOi, Nsy, Nsi. 11. Read *Sulcacis fronticornis* Panz. 12a. *C. glabratus* Mell.: Ö, AK, HEs, HEn, Os, On, Bö, VE, TEy, AAy, Nsi. 14. *C. jacquemarti* Mell.: Delete Ö, HEs, Os, VAy. 15. *C.*

lineatocribratus Mell.: AK. 17. *C. nitidus* Hbst.: HEs, HOy, delete On. 18. Read *C. linearis* Sahlb. *(perrisi* auct. nec Ab.) and add Fö. 19. *C. punctulatus* Gyll.: AAi. 20. Read *C. vestitus* Mell. *(pygmaeus* auct. nec Mrsh.) and add VE. 23. *C. setiger* Mell:. VE.

24. *Rhopalodontus perforatus* Gyll.: Delete HEn, TRy, TRi, Fö. 24a. *R. strandi* Lohse: HEn, TRy, TRi, Fö.
25. Read *Sulcacis affinis* Gyll. and add MRi.
27. Read *Hadraule elongatulum* Gyll.
31. *Octotemnus glabriculus* Gyll.: TRy.
33. *Lyctus linearis* Gze.: TEy, SFi.

318

5. *Hedobia imperialis* L.: VE.
6. *Grynobius planus* F.: AAy.
7. *Dryophilus pusillus* Gyll.: VE.
11. *Ernobius abietis* F.: VE, TEy. 14. *E. explanatus* Mnh.: Os, TEy, Fn. 15. *E. longicornis* Sturm: TEy. 16. *E. mollis* L.: Fv. 17. *E. nigrinus* Sturm: VE, TEy, AAy, AAi.
19. *Episernus angulicollis* Th.: HEn.
20. *Stegobium paniceum* L.: On, AAy.
27. *Anobium nitidum* Hbst.: Ö, AAy. 28. *A. pertinax* L.: SFi. 29. *A. punctatum* DeG.: Fv. 31. *A. thomsoni* Kr.: TEy, AAy.
36 *Ptilinus pectinicornis* L.: VE.

322

9. *Lasioderma serricorne* F.: VAy(i), STi(i).
12. *Dorcatoma chrysomelina* Sturm: VE.
24. *Niptus hololeucus* Fald.: On, Nsy, Nsi.
25. *Tipnus unicolor* Pill: VE.
31. *Ptinus raptor* Sturm: MRy, MRi, NTy, Nsy, Nnö. 32. *P. rufipes* Ol.: VE. 34. *P. subpilosus* Sturm: AAi, HOi. 35. *P. tectus* Boield.: VE, TEy, VAy, NTy, TRy. 37. *P. villiger* Rtt.: Os.

326

1. *Calopus serraticornis* L.: On, AAi, HOi.
6. Read *Ischnomera cinerascens* Pand.: 7. Read *I. coerulea* L. *(cyanea* F.). 8. Read *I. sanguinicollis* F.
9. Read *Chrysanthia nigricornis* West. *(viridis* Schm.). 10. *C. viridissima* L.: VAy.
14. *Oedemera lurida* Mrsh.: On. 18. *O. virescens* L.: Bv, Nsy, Nnö.
20. *Pytho depressus* L.: NTi.
22. *Lissodema cursor* Gyll.: VE.
24. *Rabocerus foveolatus* Ljungh: TEy, MRy, Nsy. 25. *R. gabrieli* Gerh.: Os, VE, HOy, STi, Nsy.
26 *Salpingus ater* Payk.: TEy. 28. *S. castaneus* Panz.: Os, VE, TEy.
31. *Rhinosimus planirostris* F.: MRy, MRi, STi. 32. *R. ruficollis* L.: HOi, SFy, STy, STi, NTi, Nsy, Fn, Fö.
36. *Schizotus pectinicornis* L.: SFi, MRy, Nsy.

330

3a. *Aderus oculatus* Panz.: AAy?.
7. *Notoxus monoceros* L.: HEs, TEy.
8. *Anthicus antherinus* L.: TEy. 9. *A. ater* Panz.: TEy. 13. *A. flavipes* Panz.: TEy. 14. *A. floralis* L.: VE, AAy. 18. *A. instabilis* Schm.: Ö, VE.
26. *Meloë violaceus* Mrsh.: MRi.
27. *Apalus bimaculatus* L.: VE.
32. *Mordella aculeata* L.: STi. 32a. *M. brachyura* Muls.: AAy.

334

2. *M. holomelaena* Apf.: VE. 2a. *M. huetheri* Erm.: Ö, AK, Os, Bö, AAy.
3. Read *Curtimorda maculosa* Naez.
6. Read *Mordellochroa abdominalis* F.
8. Read *Mordellistena humeralis* L. 12a. *Mordellistena pygmaeola* Erm.: AK. 12b. *M. thurepalmi* Erm.: AAy. 14. *M. variegata* F.: VE.
17. *Anaspis bohemica* Schilsky: AK, Bö, TEy. 27. *A. rufilabris* Gyll.: AAi, MRi, Nsy. 28. *A. schilskyana* Csiki: Delete ?.
32. *Tetratoma fungorum* F.: Bv, HOy.
35. *Orchesia fasciata* Ill.: TRi. 37. *O. micans* Panz.: VE, TEy. 38. *O. minor* Walk.: TEy, STi, Nsy. 39. *O. undulata* Kr.: VE.

338

1. *Abdera affinis* Payk.: AK, VE. 3. *A. flexuosa* Payk.: Nsy.
4. Read *Wanachia triguttata* Gyll. and add VE, TEy.
9 *Xylita laevigata* Hellen.: TEi, AAy.
11 *Serropalpus barbatus* Schall.: TEy.
15. *Zilora ferruginea* Payk.: VE.
20. *Conopalpus testaceus* Ol.: VE, VAy.
23. *Stenotrachelus aeneus* Payk.: HEn, Bv.
24. *Lagria hirta* L.: TEy, AAy.
32. *Pseudocistela ceramboides* L.: VE, TEy.
36. *Mycetochara humeralis* F.: AAy. 37. *M. linearis* Ill.: Ö.

342

6. *Phylan gibbus* F.: VE.
9. *Opatrum sabulosum* L.: VE.
12. *Bolitophagus reticulatus* L.: Nsy, Fö.
21. *Gnathocerus cornutus* F.: HOy.
24. *Tribolium castaneum* Hbst.: TRy. 25. *T. confusum* DuV.: Ö, VE. 26. *T. destructor* Uytt.: Ö, HEs, VE, STi.
30. *Palorus ratzeburgi* Wissm.: AK.
33. Read *U. rufa* Pill. & Mitterp. *(perroudi* Muls.).
39. *Hypophloeus linearis* F.: HEn, Os, VE, TEi, STy.

346

6. *Tenebrio obscurus* F.: HOy(i).
8. *Bius thoracicus* F.: Os.
23. *Geotrupes stercorarius* L.: Nsy. 24. *G. stercorosus* Scriba: Nsy, TRi.
28. *Aphodius ater* DeG.: TEy, AAy, AAi. 29. *A. borealis* Gyll.: TEy. 32. *A. conspurcatus* L.: VE, STi. 37. *A. fasciatus* Ol.: AAy.

350

4. *A. haemorrhoidalis* L.: Bv. 10. *A. merdarius* F.: VE. 11. *A. nemoralis* Er.: AK, HEs. 15. *A. piceus* Gyll.: Ö, TEy. 17. *A. plagiatus* L.: AK, VE. 19. *A. prodromus* Brahm: VE: 23. *A. rufipes* L.: MRi. 24. *A. rufus* Moll.: Nsy. 25. *A. sabulicola* Th.: HEn, Bv.
36. Read *Heptaulacus villosus* Gyll.

354

1. *Aegialia arenaria* F.: VE.
11. *Amphimallon solstitialis* L.: SFy.
16. *Phyllopertha horticola* L.: AAi.
24. *Trichius fasciatus* L.: AAi, Fö.
26. Read *Potosia cuprea* F. and add SFy, MRy.
27. Read *Liocola lugubris* Hbst.
30. *Platycerus caprea* DeG.: AK. 31. *P. caraboides* L.: STy.
34. *Sinodendron cylindricum* L.: MRi.
38. *Spondylis buprestoides* L.: AAi, HOi, SFi, MRi.
39. *Asemum striatum* L.: Bv, AAi, VAi, Nsy.

358

1. Read *Nothorhina punctata* F. *(muricata* Dalm.).
3. *Tetropium castaneum* L.: On, HOy. 4. *T. fuscum* F.: Bv, VE, NTi.
5. Read *Criocephalus tristis* F. *(ferus* Muls.). 6. *C. rusticus* L.: MRi.
9. *Gracilia minuta* F.: AK(i).
12. *Rhagium bifasciatum* F.: HOy. 13. *R. inquisitor* L.: AAi, VAi, Nsy. 14. *R. mordax* DeG.: Nsy.
16. *Toxotus cursor* L.: Bv, AAi, Ry, SFi, MRi, Nsy.
17. *Stenocorus meridianus* L.: STi.
18. *Pachyta lamed* L.: Fv.
20. *Evodinus borealis* Gyll.: AK, Nsy. 21. *E. interrogationis* L.: AK.
23. *Acmaeops marginata* F.: AK. 25. *A. septentrionis* Th.: HEn.
31. *Grammoptera ruficornis* F.: VE, HOy.
40. *Leptura sanguinolenta* L.: Nsy.

362

4. *Judolia sexmaculata* L.: HOi.
16. Read *Nathrius brevipennis* Muls. and add HOy(i).
19. *Aromia moschata* L.: VE, Ry, SFi.

25. *Phymatodes alni* L.: VAy. 27. *P. testaceus* L.: VAy.
30. *Callidium violaceum* L.: AAi, Nsy, Fv.
32. *Semanotus undatus* L.: Bv.
33. *Hylotrupes bajulus* L.: VE, AAi, HOy, STi.
34. *Xylotrechus antilope* Schnh.: VAy.
37. *Clytus arietis* L.: VE, SFy.

366

1a. *Dorcatypus tristis* F.: AK(i).
5. *Monochamus sutor* L.: Bv, AAi, VAi, HOi.
9. *Oplosia fennica* Payk.: Ö, VE.
11. *Pogonocherus decoratus* Frm.: Fö. 12. *P. fasciculatus* DeG.: Fn. 14. *P. hispidus* L.: VE, AAi, HOi.
16. *Leiopus nebulosus* L.: VE.
18. *Acanthocinus aedilis* L.: Os, AAi, SFi, MRi, Nsy, Nnö.
24. *Saperda carcharias* L.: Nsy. 27. *S. scalaris* L.: Ry, Nsy.
30. *Oberea oculata* L.: VE, VAy, MRi.
32. *Stenostola ferrea* Schrk.: AK.
35a. *Tetrops starki* Chevr.: AK.
37. Read *Macroplea mutica* F. and add TRy, TRi.

370

7. *Donacia clavipes* F.: TEy. 11. *D. impressa* Payk.: MRy. 13. *D. obscura Gyll.*: Nnö. 16. *D. sparganii* Ahr.: VE. 20. *D. versicolorea* Brahm: HOi, Nnö. 21. *D. vulgaris* Zschach: On, TEy.
25. *Plateumaris discolor* Panz.: Nsy, Fö. 27. *P. sericea* L.: TEy.
29. *Orsodacne cerasi L.*: Ö.
30. *Syneta betulae* F.: VE.
33. *Zeugophora subspinosa* F.: TRi.
37. *Lema lichenis* Voet: HEs.
41. *Lilioceris lilii* Scop.: VE. 42. *L. merdigera* L.: HOy.

374

12. *Cryptocephalus bilineatus* L.: Ö. 24. *C. fulvus* Gze.: VE. 26. *C. labiatus L.*: Nsy. 30. *C. nitidus* L.: On, VE. 34. *C. pini* L.: VE. 35. *C. punctiger* Payk.: VE. 37. *C. quadripustulatus* Gyll.: TEy, NTi.

378

3. *Adoxus obscurus* L.: Nsy.
18. *Chrysomela marginata* L.: VE, Nsy. 19. *C. menthastri* Suffr.: Delete TRy, TRi. 23. *C. sanguinolenta* L.: Bv, VE. 24. *C. staphylea* L.: TEi. 25. *C. varians* Schall.: SFi. 26. Read *C. diversipes* Bed. *(violacea* Müll.).
30. *Gastroidea viridula* DeG.: MRi, Nsy, TRy.
32. *Phaedon cochleariae* F.: VE. 33. *P. concinnus* Steph.: HEn.
34. *Hydrothassa glabra* Hbst.: SFy.
40. *Melasoma aenea* L.: STi, Nnv. 41. *M. collaris* L.: HOi.

382

2. *M. lapponica* L.: Nsy.
9. *Phytodecta intermedius* Hellies.: SFi. 10. Read *P. linnaeanus* Schrk. ssp. *orientalis* Weise, add Os and delete VAy. 14. *P. quinquepunctatus* F.: Nsy.
26. *Galerucella lineola* F.: Os, Bv. 28. *G. nymphaeae* L.: Ry. 30. Read *G. aquatica* Geoffr. *(sagittariae* Gyll.) and add Ry. 31. *G. tenella* L.: HOy, SFi, MRy, Nsy.
39 *Lochmaea capreae* L.: AAi. 41. *L. suturalis* Th.: VE, HOi.

386

2. *Luperus flavipes* L.: Ry. 3. *L. longicornis* F.: MRi, NTi.
17. *Phyllotreta undulata* Kutsch.: STi.
24. *Aphthona euphorbiae* Schrk.: Bö, TEy.
32. *Longitarsus atricillus* L.: VE. 40a. *L. kutscherae* Rye: AK, HEs, Os, Bö, VE, VAy. 42. *L. luridus* Scop.: TEi, SFi.

390

2. *L. melanocephalus* DeG.: MRy. 6a. *L. nigrofasciatus* Gze.: AK. 7. *L. ochroleucus* Mrsh.: AK. 9. *L. pellucidus* Foud.: AK.

10. *L. pratensis* Panz.: VE, VAy, SFi. 11a. *L. reichei* All.: AK. 13. *L. succineus* Foud.: VE. 14. *L. suturalis* Mrsh.: Delete HEs. 15. *L. suturellus* Dft.: Ö, VE. 16. *L. tabidus* F.: VE.

24. *Haltica engstroemi* J. Sahlb.: VE. 25. *H. oleracea* L.: Ri. 28. Read *H. quercetorum* Foud. ssp. *saliceti* Weise.

35a. *Crepidodera interpunctata* Mtsch.: Ö.

394

2. *Chalcoides fulvicornis* F. HOy, HOi. 3. *C. lamina* Bed.: Ö. 4. *C. nitudula* L.: Ry.

10. Read *M. ambigua* Kutsch. instead of *M. pallidicornis* Waltl (*subrotundata* A. Jns., *obtusata* 1939).

13. *Chaetocnema concinna* Mrsh.: Delete Bö, TEi. 14a. *C. heikertingeri* Ljub.: Ö, AK, HEs, Os, Bö, VE, TEy, AAy.

29. *Psylliodes affinis* Payk.: VE. 40. *P. napi* F.: On, VE. 41. *P. picina* Mrsh.: VE.

398

9. *Cassida hemisphaerica* Hbst.: VE. 16. *C. rubiginosa* Müll.: Nsy. 17. *C. sanguinolenta* Müll.: VE. 22. *C. viridis* L.: VE.

25. *Bruchus atomarius* L.: STi. 26. *B. loti* Payk.: VE.

402

4. *Brachytarsus nebulosus* Forst.: VE.

6. *Araeocerus fasciculatus* DeG.: HOy.

9. *Rhinomacer attelaboides* F.: VE, STi.

15. *Coenorrhinus aequatus* L.: TEy.

35. *Apion apricans* Hbst.: HOi. 38. *A. astragali* Payk.: VE.

406

13. *A. ebeninum* Kby.: HEs, VE. 14. *A. ervi* Kby.: VE, HOy. 18. *A. flavipes* Payk.: AAi, HOi. 25. *A. hookeri* Kby.: Ö. 28. *A. interjectum* Desbr. VE. 31. *A. loti* Kby. VE. 32. *A. marchicum* Hbst.: HOi.

410

14. *A. sedi* Germ.: VE. 16. *A. simile* Kby.: HEs. 19 *A. stolidum* Germ.: AAy. 26. *A. viciae* Payk.: HOi. 28. *A. violaceum* Kby.: VE. 29. *A. virens* Hbst.: SFi.

34. *Otiorrhynchus dubius* Ström: MRi. 35. *O. ligneus* Ol.: TEy. 37. *O. ovatus* L.: AAi, MRi. 39. *O. porcatus* Hbst.: AK, Bv, MRy. 41. *O. rugifrons* Gyll.: TEy.

414

3. *O. scaber* L.: AAi, Nsy. 5. *O. sulcatus* F.: VE, MRy, STi, Nsi, TRy.

11. *Trachyphloeus aristatus* Gyll.: VE. 12. *T. bifoveolatus* Beck: STi.

22. *Phyllobius calcaratus* F.: AAy. 30. *P. viridicollis* F.: Ö, TEi.

36. *Polydrosus mollis* Ström: Nsy. 37. *P. pilosus* Gredl.: SFi, Nsy. 39. *P. ruficornis* Bonsd.: HEs, Nsy. 41. *P. undatus* F. Nsy.

418

1. *Sciaphilus asperatus* Bonsd.: SFi, Nsy.

2. *Brachysomus echinatus* Bonsd.: Nsy.

6, *Barypithes mollicomus* Ahr. VE. 7. *B. pellucidus* Boh.: VE, VAy, HOy.

13. *Strophosomus melanogrammus* Forst.: MRi. 14. Read *S. capitatus* DeG. (*rufipes* Steph.) and add AAi. 23. Read *S. lineellus* Bonsd. (*decipiens* Har. Lbg) and add Nsy. 24. *S. flavescens* Mrsh.: VE. 29. Read *S. ambiguus* Gyll. (*lineellus* auct. nec Bonsd.) and add NTi. 30. *S. puncticollis* Steph.: AK.

38. *Tropiphorus carinatus* Müll.: HOy.

41a. *Larinus scolymi* Germ.: Bö(i).

422

18. *Eremotes ater* L.: HOy, Nsy, Nnö. 20. Read *E. sculpturatus* Waltl (*nitidipennis* Th.) and add VE.

40. *Bagous limosus* Gyll.: VE.

426

10. *Dorytomhus affinis* Payk.: Fi. 22. *D. taeniatus* F.: Nsy.
33. Read *Grypus equiseti* F. var. *atrirostris* F. 35. *G. equiseti* F.: HOi.
41. *Elleschus bipunctatus* L.: Nsy.

430

6. *Tychius flavicollis* Steph.: VE. 9. *T. meliloti* Steph.: VE.
21. *Anthonomus bituberculatus* Th.: HEs, HOy. 23. *A humeralis* Panz.: Ö. 24. Read *A. ulmi* DeG. *(inversus* Bed.). 26. *A. pomorum* L.: Ry. 29. *A. rubi* Hbst.: SFi.
35. *Bradybatus kellneri* Bach: VE.
36. *Furcipes rectirostris* L.: HOy, SFy, STi.
37. *Brachonyx pineti* Payk.: Os, TEi.
38. *Curculio cerasorum* Payk.: STi.

434

6 *Pissodes pini* L.: Nnö. 7. *P. piniphilus* Hbst.: On, SFy.
9 *Magdalis armigera* Geoffr.: VE. 10. *M. barbicornis* Latr.: Ö. 13. *M. duplicata* Germ.: HEn, VE. 16. *M. frontalis* Gyll.: AAi. 17. *M. linearis* Gyll.: VE. 21. *M. phlegmatica* Hbst.: TEy, AAi, SFy, NTi, Fö. 23. *M. violacea* L.: STi.
25. *Lepyrus arcticus* Payk.: Ri, Nsy.
28. *Hylobius abietis* L.: Nsy.
34. *Liosoma deflexum* Panz.: AK, HOi.
35. *Phytonomus adspersus* F.: VE, TEy, Ry. 39. *P. elongatus* Payk.: Ö, VE.

438

2. *P. nigrirostris* F.: TEi, Nsi. 5. *P. plantaginis* DeG.: VE, HOi. 8. *P. trilineatus* Mrsh.: VE.
14. *Calandra granaria* L.: TEy, MRy. 15. *C. oryzae* L.: VE(i), TEy(i).
16. Read *Cryptorrhynchus lapathi* L. and add AAi, MRi, STi.
26. Read *Limnobaris t-album* L. var. *reitteri* Munst.
32. *Rhytidosoma globulus* Hbst.: VE.
37. *Coeliodes rubicundus* Hbst.: SFi.
38. *Auleutes epilobii* Payk.: Ö.
42. *Micrelus ericae* Gyll.: HOi.

442

2. *Cidnorrhinus quadrimaculatus* L.: SFi.
9. *Ceuthorrhynchus atomus* Boh.: AK. 11. Read *C. floralis* Payk. var. *cakilis* V. Hns. and add VE. 17. *C. contractus* Mrsh.: SFi. 21. *C. erysimi* F.: VE, SFi. 24 *C. floralis* Payk.: Bv, VE, HOy, SFi. 28. *C. hampei* Bris.: AK. 32. *C. ignitus* Germ.: Ö, AK. 35. *C. litura* F.: VE.

446

5. *C. pollinarius* Forst.: Ry. 8. *C. punctiger* Gyll.: HOi. 11. *C. querceti* Gyll.: On. 19. Read *C. unguicularis* Th. *(schoenherri* auct. nec Bris) and add AK. 21. *C. sulcicollis* Payk.: Os.
31. *Rhinoncus gramineus* F.: VE.
35. Read *Eubrychius velatus* Beck.
41. *Phytobius quadrituberculatus* F.: VE, MRy. 42. *B. waltoni* Boh.: VE.

450

2. *Amalus haemorrhous* Hbst.: VE.
13. *Mecinus pyraster* Hbst.: VE.
26. *Miarus campanulae* L.: AAy, AAi. 29. Read *M. campanulae* L. var. *rotundicollis* Desbr.
30. *Cionus hortulanus* Geoffr.: VE. 33. *C. scrophulariae* L.: HOy, STi.
36. *Cleopus pulchellus* Hbst.: Ö, Ri.

454

2. *Rhynchaenus decoratus* Germ.: VE. 3. *R. fagi* L.: HOy, delete Ö. 4. *R. flagellum* I. B. Erics.: HOi, SFi, STi. 5. *R. foliorum* Müll.: HOi, SFi. 13. *R. rusci* Hbst.: HOy.
17. *Rhamphus oxyacanthae* Mrsh.: VE.
20. *Scolytus intricatus* Ratz.: VAy. 21. *S. laevis* Chap.: Ö. 26. *S. ratzeburgi* Jans.: NTi. 27. *C. rugulosus* Ratz.: Ö.
30. Read *Leperisinus varius* F. *(fraxini* Panz.)

and add Ri, HOi. 30a. *L. orni* Fuchs: Ö, AK.

29. *Hylesinus crenatus* F.: HOi. 31. *H. oleiperda* F.: Ö.
34. *Dendroctonus micans* Kug.: Os, Bv.
35. *Blastophagus minor* Hart.: TEi, SFi, MRy, MRi. 36. *B. piniperda* L.: Bv, VAi, SFi, Fn.
38. *Hylurgops glabratus* Zett.: HEs, On, Bv, TEy, NTi. 39. *H. palliatus*. Gyll.: VAi, SFy, SFi, MRy, Nsy, Nnö, Fö.

458

1. *Hylastes angustatus* Hbst.: VE. 3. *H. attenuatus* Er.: VE. 4. *H. brunneus* Er.: Bv, VE, MRy, Fn. 5. *H. cunicularius* Er.: Bv, VE, Ry, Ri, SFi, STy, STi. 6. *H. opacus* Er.: VE, Ry.
7. Delete *Polygraphus griseus* Egg. 8. *P. poligraphus* L.: Ö, Bv, VE. 9. *P. punctifrons* Th.: HEn, On, Bv, TEy, STi, NTi. 10. *P. subopacus* Th.: Bv, TEy, delete AK.
14. *Crypturgus cinereus* Hbst.: TEy. 15. *C. hispidulus* Th.: Ö, TEy. 17. *C. subcribrosus* Egg.: VE.
18. *Cryphalus abietis* Ratz.: HEs, Bv, TEy, AAi, VAy, Ry. 19. *C. saltuarius* Weise: Delete Ri.
20. *Ernoporus caucasicus* Lindem.: AK, TEy, AAy, VAy, HOi. 22. *E. tiliae* Panz.: VE, TEy, AAy.
29. *Phthorophloeus spinulosus* Rey: HEn, TEy, AAy, Nsi.
33. *Dryocoetes alni* Georg.: HEs, Bv, TEy, VAy, Ri, HOi, SFi, MRy, Nsy. 34. *D. autographus* Ratz.: Bv, HOy. 36. *D. hectographus* Rtt.: Ö, On, Bv, TEy, VAy, HOi, MRy, NTi. 37. *D. villosus* F.: AAy.
39. *Pityophthorus glabratus* Eichh.: HEs, VE, TEy. 40. *P. lichtensteini* Ratz.: TEy, AAy, Fn, Fö. 41. *P. micrographus* L.: On, VE, TEy, AAi.

Received 23 April 1970

462

1. *P. pubescens* Mrsh.: VAy, Ri.
3. Read *Xyloterus domesticus* L. and add HEs, Bv, VE, VAy, Ri. 4. Read *X. lineatus* Ol. and add HEn, Bv, VE, Ry, SFi, Fn, 5. Read *X. piceus* A. STr. and add TRi. 6. Read *X. signatus* F.
7. *Pityogenes bidentatus* Hbst.: Os, VE, VAi, HOy, HOi, SFy, MRy, NTi, Fö. 8. *P. chalcographus* L.: Bv, HOi, STy. 10. *P. quadridens* Hart.: HEn, Bv, VE, HOy, SFy, STi, Fn. 12. *P. trepanatus* Nordl.: AAy.
13. *Ips acuminatus* Gyll.: Bv, Ry, SFy, STy, NTy. TRy. 16. *I. duplicatus* Sahlb.: HEn, Bö, Bv. 17. *I. sexdentatus* Börn.: Fö. 19. *I. typographus* L.: Fi.
22. *Orthotomicus proximus* Eichh.: HEn, Os, SFi.
25. *Xyleborus cryptographus* Ratz.: VE, AAy.

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Most of the particulars regarding the distribution of the species have been sent by a large number of contributors. I thank them all, particularly cand. real Johan Andersen, Tromsö, Dr. Alf Bakke, Vollebekk, and stud. real. Arne Fjellberg, Bergen.

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On the Distribution, Sex Ratio, and Development of *Polyxenus lagurus* (L.) (Diplopoda) in Norway

BJARNE A. MEIDELL

Meidell, Bjarne A. 1970. On the Distribution, Sex Ratio, and Development of *Polyxenus lagurus* (L.) (Diplopoda) in Norway. *Norsk ent. Tidsskr. 17*, 147-152.

Populations of *Polyxenus lagurus* (L.) from Hordaland are reported to consists of about fifty percent males. The distribution of the parthenogenetic and bisexual races in Europe is discussed in relation to the material from Norway. New localities are given, and some remarks are made on the post-embryonal development of *P. lagurus* from Hordaland.

Bjarne A. Meidell, Zoological Museum, University of Bergen, 5000 Bergen, Norway

DISTRIBUTION

Earlier records (Ellingsen 1892, 1896, 1903, 1910) mention *Polyxenus lagurus* (L.) as very common and possibly widely distributed in Norway.

New localities: Unless otherwise stated, the specimens are collected by the author. The roman numbers in the list refer to the development-stage involved (I-II- . . . -VII-ad.). This differentiation into development-stages has in every case been made by the author.

Outer part of Hordaland: Tysnes, Ånuglo under bark of living pine 22 June 1967 8 (ad.), 26 May 1968 1 (III) + 3 (V), 29 May 1969 4 (V). Stord, Storsöy 4 July 1965 1 (ad.), 15 Apr. 1966 1 (ad.), 16 June 1966 2 (I) + 1 (III) + 1 (IV) + 1 (ad.), 4 July 1966 1 (VI), 10 Aug. 1966 1 (ad.), 29 Aug. 1966 2 (ad.), 23 Feb. 1967 2 (VII) + 36 (ad.) leg. et det. B. Kvamme, 29 May 1969 1 (ad.). Kvinnherad, Rosendal, Skeie 8 June 1943 1 (ad.), 13 June 1943 1 (VI) + 1 (ad.) leg. et det. H. Tambs-Lyche, Rosendal, Rödsvågen 26 June 1943 1 (VI) + 1 (ad.) leg. et det. H. Tambs-Lyche, Rosendal, Avlsgården 25 May 1968 1 (ad.). Bömlo, Espevær, Upsöy 19 May 1968 shifting 20 (I) + 2 (II) + 29 (III) + 14 (IV) + 13 (V) + 17 (VI) + 21 (VII) + 23 (ad.) leg. T. Solhöy, det. H. Kauri. Fana, Milde Sauaneset 7 Apr. 1969 6 (VII) + 8 (ad.) leg. et det. T. Solhöy. Laksevåg, Alvöen 13 June 1942 1 (III) + 1 (IV) + 1 (V) + 3 (VII) + 2 (ad.) leg. et det. H. Tambs-Lyche. Os, Hatvik 21 Dec. 1952 2 (VII) + 2 (ad.) leg. H. Kjennerud, det. H. Tambs-Lyche.

Inner part of Hordaland: Röldal, Röldal 16 July 1938 1 (ad.) leg. et det. H. Tambs-Lyche. Ullensvang, Börve 16 Apr. 1945 1 (V) leg. et det. H. Tambs-Lyche. Eidfjord, Hjölmodalen 1 July 1967 60 m above sea level 1 (ad.) leg. J. Rönhovde, 2 July 1967 talus, moss, gras 100 m above sea level 1 (ad.) leg. K. Björklund, 7 July 1967 1 (ad.) leg. J. Rönhovde, 9 July 1967 moss, litter 1 (ad.) leg. K. Björklund, 14 July 1967 gras, moss, heather 310 m above sea level 1 (ad.) leg. J. Rönhovde.

Bergen: Blekenberg 24 Apr. 1943 2 (ad.) leg. et det. H. Tambs-Lyche.

Vestfold: Tjöme, Kjæreskogen under bark of dead *Pinus silvestris* 4 Jan. 1970 1 (I) + 1 (IV) + 19 (V) + 2 (VI) + 21 (VII) + 26 (ad.), 5 Jan. 1970 1 (III) + 8 (IV) + 9 (V) + 3 (VI) + 10 (VII) + 7 (ad.), 6 Jan. 1970 2 (II) + 25 (V) + 13 (VI) + 12 (VII) + 9 (ad.), 8 Jan. 1970 2 (I) + 6 (II) + 15 (IV) + 48 (V) + 4 (VI) + 48 (VII) + 31 (ad.) leg. et det. A. Fjellberg.

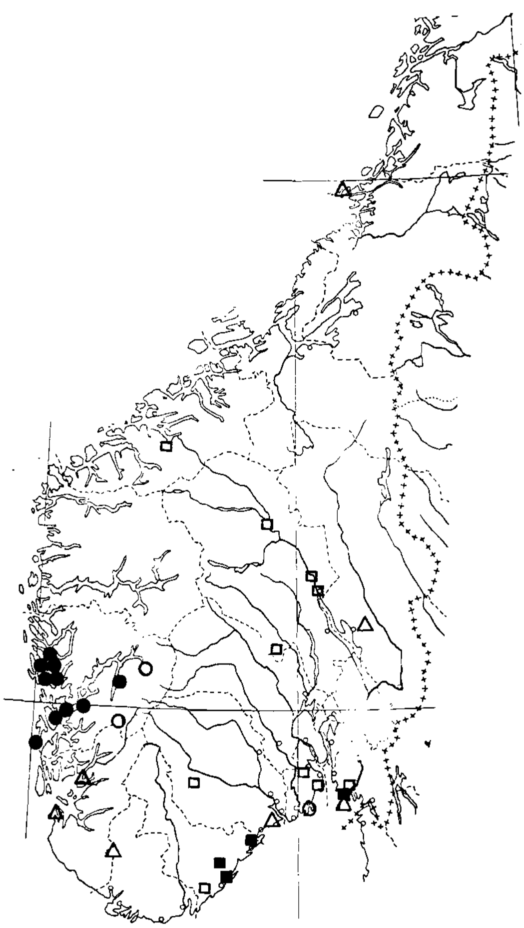

Fig. 1. Distribution of *Polyxenus lagurus* in Norway. New localities, filled circles: bisexual race; open circles: parthenogenetic race. Earlier records, filled square: males and females; open square: only females; open triangle: find not checked.

P. lagurus is probably much more common in Hordaland than the above-mentioned finds imply. This is due because it is found in localities where diplopods are not usually sought, and it is easily overlooked because of its small size and dull colouring. Schömann (1956) reaches the same conclusion for *P. lagurus* in Germany, and he suspects it to be the most numerous diplopod there. All my finds of *P. lagurus* were made under bark on living pine. There it is frequently found in aggregations together with old cuticles from earlier ecdysises. In Finland (Palmén 1949) and Germany (Schömann 1965), *P. lagurus* is reported from under bark of pine, spruce, birch, alder, willow, asp, lime, oak, and elm, but most often on pine. However, it must not be regarded as a diplopod living exclusivly under bark, like *Isobates varicornis* (C. L. Koch 1847), as large finds were made in shifting moss and litter (Upsöy 19 May 1968 and Milde 7 Apr. 1969). *P. lagurus* is reported from all over Europe (Schubart 1934, 1963). In Finland it is found at 63°30′N, which Palmen (1949) claims to be the northernmost locality. However, Strand had previously (Ellingsen 1910) recorded it from the island of Vikna near Rörvik in North-Tröndelag about 65°N. The distribution in Norway is shown in Fig. 1.

SEX RATIO

Earlier records mention nothing about the sex ratio of *P. lagurus* in Norway.

The females of *Polyxenus* have one pair of vulves behind the second pair of legs, like other diplopods, but they cannot withdraw them like other diplopods.

As the males of *P. lagurus* are rare, they are poorly described in the literature most often used for identification. Usually the male diplopod has a pair of thin, tubelike penises concealed in the body behind the second pair of legs, but in *Polyxenus* there are two conelike structures, resembling the vulves of the female. The penis is a cone ending in a tip, the vulva is a cone with its tip cut off (in this case, the view of both penis and vulva is probably from below). Good drawings were made by Schömann (1956).

The full-grown male is somewhat smaller than the female, and the two bundles of trichomes on telson are clearly slimmer in the male. With some practice, this last character may be of practical value for the determination of the sex of living specimens of *P. lagurus* (Fig. 2). Schömann (1956) gives an account of the distribution of the sexes of *P. lagurus* based on his own observations and records from various authors, chiefly Vandel (1926). Vandel (1926) gives the following ratios: Toulouse (France) 41.6 % ♂♂ (in 132 specimens);

Alkmar (the Netherlands) 39 % ♂♂ (in 301 specimens); Copenhagen Museum Collection (Denmark) 8.7 % ♂♂ (in 57 specimens); Lohmanders Collections (Southern Sweden) from various districts 5.7 % ♂♂ (in 876 specimens); Museum Collections from Helsinki and Turku (Finland) 0 % ♂♂ (in 58 specimens). On the basis of his material, Vandel (1926) concludes that *P. lagurus* is a typical example of geographical parthenogenesis, the ratio of males sinks from south to north, more exactly from south-west to north-east. To Vandel's (1926) number, Schömann (1956) adds 63 specimens from the eastern Pyrenees containing 42.8 % ♂♂, but he points out the insufficiency in the material from Denmark and Finland. However, Palmén (1949) had previously reported that 3800 specimens of *P. lagurus* from Finland had been examined, without a single male being detected.

A fact that does not coincide with Vandel's (1926) theory is that a male of *P. lagurus* has never been found in Germany. Schömann (1956) stated that earlier records were due to wrong identification and that he had examined more than 10,000 specimens. The island of Sylt is excepted in this figure. Here Schömann (1956) first found 40 % ♂♂ and in a second investigation, somewhat more than 50 % ♂♂ among 1141 specimens. On the neighbouring island of Föhr, *P. lagurus* was not found.

Schömann (1956) divides *P. lagurus* in two

Table I. *Polyxenus lagurus* from Hordaland

Sex	Specimens at stage VII	Specimens at stage ad.
♀♀	17	43
♂♂	16	43

Table II. *P. lagurus* in material published by Ellingsen (1891, 1896, 1903)

Sex	Specimens at stage VII	Specimens at stage ad.
♀♀	10	50
♂♂	3	4

Fig. 2. Photograph showing the hindmost parts of two specimens of *P. lagurus*, female to the left and male to the right. Notice the difference in width of the backward-pointing brushes.

races, one bisexual (Sylt) and one parthenogenetic (rest of Germany). The bisexual race differs from the parthenogenetic by having two median and two lateral lines in red-brown on the dorsal side of the body. The parthenogenetic race has no such markings. Schömann's (1956) experiments show that the female of the bisexual race never lays eggs without fertilization in advance, and the female of the parthenogenetic race does not take sperm from the web where the male of the bisexual race has placed it. Schömann (1956) suggests a theory that the appearance of the bisexual race of *P. lagurus* is dependent on humid (coastal) climate.

P. lagurus from Hordaland has the above-mentioned colour-markings. We must exclude the specimens from Eidfjord (7 ♀♀) and Röldal (1 ♀) where the mid-dorsal lines are most indistinct. These animals are not included in the Table below, nor are some that had been injured and consequently unsuitable for sex-determination.

The material from Hordaland of stage VII and ad. contained 49.6 % ♂♂ (Table I). It is at stage VI that the sex of *P. lagurus* first can be determined. To be on the safe side, I decided to use only the stages VII and ad. in illustrating the sex-ratio. This percentage of males does not agree well with Vandel's (1926) theory on geographical parthenogenesis, but rather supports Schömann's (1956) suggestion that

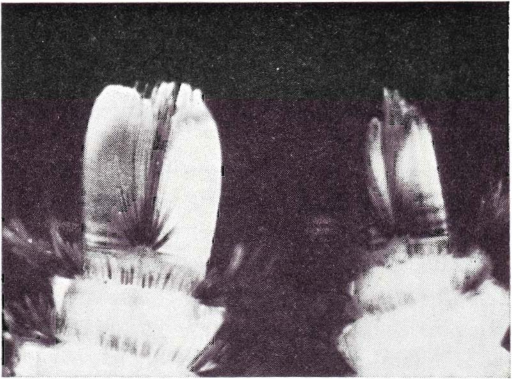

Fig. 2. Photograph showing the hindmost parts of two specimens of *P. lagurus*, female to the left and male to the right. Notice the difference in width of the backward-pointing brushes.

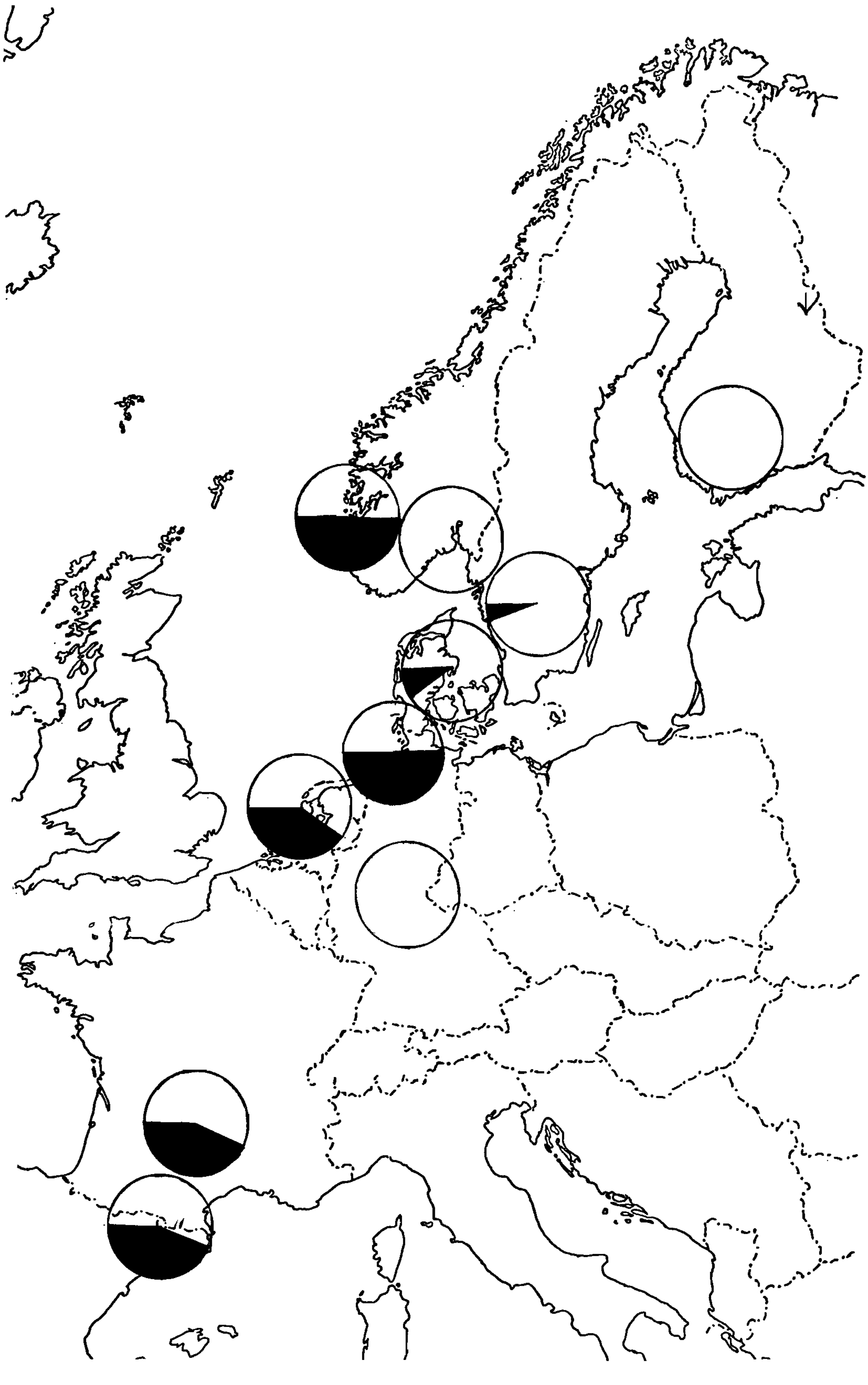

Fig. 3. Sex ratio of *Polyxenus lagurus* in Europe. The circles illustrate the percentage of males and females of *P. lagurus*. Open parts, females; filled parts, males. Germany and Norway are represented by two circles each, one for the parthenogenetic (Germany, mainland, and Norway, Tjöme) and one for the bisexual race (Germany, Sylt and Norway, outer parts of Hordaland). Centre of each circle are at the localities published. Data from Vandel (1926), Palmén (1940) and Schömann (1956), plus data from Norway.

the humid climate is a determinaing factor. I have had the opportunity to examine the material that Ellingsen published in 1892, 1896 and 1903, now in the collections of the Zoological Museum in Oslo. The sex-ratio in this material is shown in Table II. The males are from the following localities: Kragerö, Fredrikstad, Boröy and Tromöy, all on the Skagerak coast.

The specimens from Tjöme (leg A. Fjellberg) are all of the parthenogenetic race, described by Schömann (1956). Carmine is the dominating colour, especially on the sides, head, and legs. The coloured parts have a mottled appearance, especially on the legs. The material from Tjöme included 91 specimens of stage VII and 73 adult specimens. The differences in sex-ratios in *P. lagurus* from Europe are illustrated in Fig. 3.

DEVELOPMENT

P. lagurus develops through seven stages (indicated I-VII) till the adult stage (indicated ad.). Schömann (1956) reports that *P. lagurus* continues its ecdysises even after the adult stage, but he does not mention anything that might remind one of the so-called halt-stages that at least some iulides have.

The development of segments and pairs of legs in specimens from Hordaland is shown in Table III. The measurements of length and width, including trichomes, are given in mm. The number of specimens belonging to each stage is also given in the Table. Stage II is only represented by two specimens in the material from Hordaland. In explaining this, one must pay attention to the fact that in the sample from Upsöy 19 May 1968, this stage was under-represented in comparison with the others. More about this later on.

Schömann (1956) investigated the development of *P. lagurus* in Germany. There the bisexual race has two breeding periods in the year, one in spring and one in autumn. This gives two different periods of development; the animals belonging to these he named summer-animals and winter-animals respectively. Schömann (1956) showed how temperature influences the rate of development; the winter-animals take twice as long from stage I to ad. as the summer-animals do. The mean temperature during the experiment with winter-animals was 8-11° C. The period these animals spent at each stage is shown in the last column of Table III. Here stage II shows a shorter duration than any of the others. A further study is needed to find the corresponding periods for *P. lagurus* on the western coast

Table III. Measurement and development of *P. lagurus* in Hordaland. Data on duration of each stage from Schömann (1956)

Stage	Length (mm)	Width	Body segments	Pair of legs	Number of specimens	Duration of each stage in days at 8-11 °C.
I	0.8-1.0	0.50-0.68	5	3	22	30
II	0.9-1.0	0.50-0.64	5	4	2	24
III	1.2-1.4	0.70-0.96	6	5	32	32
IV	1.2-1.7	0.64-0.80	7	6	16	34.5
V	1.6-2.1	0.84-1.00	8	8	22	40.5
VI	1.6	0.60-0.80	9	10	24	46
VII	2.1-2.5	0.76-1.05	10	12	36	98.5
ad.	2.4-3.6	1.00-1.40	11	13	99	98

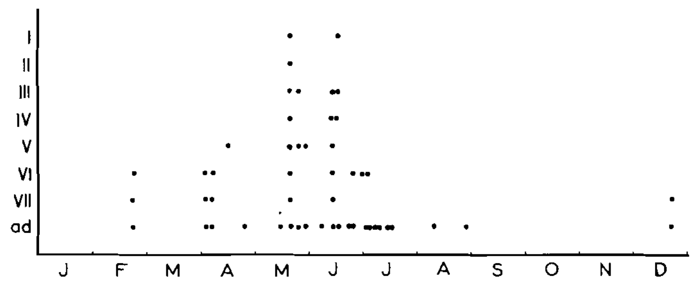

Fig. 4. The finds of *P. lagurus* in Hordaland. Developmental stage is plotted against date of catching.

of Norway, but a short duration of stage II might explain the low number by which this stage was represented in the sample from Upsöy 19 May 1968.

In Schömann's (1956) experiment, the winter-animals used 305.6 days through the stages I-VII. He further noticed that when the temperature sank towards 0° C, the animals of the bisexual race seemed to lie dormant. Such a situation might result in the animals overwintering at different stages, depending on how early they hatched. In Fig. 4 development stages of the material from Hordaland are plotted against the time of the year the catches were made. They have not, however, been correlated to fluctuations in the mean temperature of the years. At Sylt the first reproduction period in 1954 stretched from 14 Apr. to 21 June and the second period from 7 Sept. to 12 Nov. In 1955 the first period started as early as the end of February, probably due to favourable temperature. About 26 days after the female has sucked in the sperm, she deposits her eggs. The hatching starts 26 days later (at 23° C, 38-40 days at 10° C).

Recalling the above mentioned development-times, Fig. 4 might suggest only one reproduction period for the bisexual *P. lagurus* in Hordaland, but further investigations and experiments are needed before this can be definitely stated. From Fig. 4 one might presume that the fertilization takes place about March-April. The fact that *P. lagurus* is able to reproduce at stage VII, makes interpretation difficult. Even at stage VI it shows signs of sexual behaviour (Schömann 1956).

In the parthenogenetic females of *P. lagurus* (in Germany), egg deposition is observed during the whole year (Schömann 1956).

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Contribution from Nordic Forest Entomologists' Research Group

Insect Pests in Forests of the Nordic Countries 1961-1966

ERIK CHRISTIANSEN

Christiansen, E. 1969. Insect Pests in Forests of the Nordic Countries 1961-1966. *Norsk ent. Tidsskr. 17,* 153-158.

The forest insect situation in the Nordic countries — Denmark, Finland, Norway, and Sweden — during the period 1961-1966 is reviewed. Outbreaks of the most important pests in deciduous and coniferous forests are especially pointed out, whereas other outbreaks are presented in a tabular form. In addition, the paper summarizes the most severe chronic insect problems.

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During the last decades, links between the Nordic Countries Denmark, Finland, Norway and Sweden, have become stronger in practically every field.

This cooperation also concerns forestry in general, and forest entomology in particular. The problems to be faced by forest entomologists are to a great extent similar in the four countries.

The Nordic forests, covering approximately 520,000 sq. km., constitute about one third of Europe's forestral area (excluding U.S.S.R.).

In Denmark and southernmost Sweden, deciduous woods, mainly consisting of beech and oak, are naturally predominant. In the northernmost part and along the Scandinavian mountain range, birch forest covers large areas.

The major part of the Nordic forests, however, consists of Scotch pine, *Pinus silvestris* L. and Norway spruce, *Picea abies* (L.) Karsten. Norway spruce is not native in Denmark, but has been introduced. Other conifers have also been introduced to some extent, particularly in Denmark, in parts of Finland and in the western coastal districts of Norway.

Owing to the great variations in topography, climate, and edaphic conditions, a large number of forest insect species occur. This is one of the factors calling for close cooperation among forest entomologists.

Compared with Central and South Europe, forest insect problems are moderate in the four countries. A general view of forest entomology in the Nordic countries has been presented by Lekander (1964). Surveys of the forest insect problems in the various countries are given by Bejer-Petersen (1959), Butovitsch (1957), and Kangas (1958).

This paper gives an outline of the forest insect situation during the years 1961-66. The relatively few species which have had important outbreaks will be briefly mentioned at first, then other noteworthy insects are presented, and in addition, some more chronical insect problems will be pointed out.

IMPORTANT OUTBREAKS OF INSECT PESTS

Oporinia autumnata Bkh., a lepidopterous defoliator on mountain birch has appeared in vast numbers in the Arctic and Alpine region during the period (Tenow 1965). Locally the

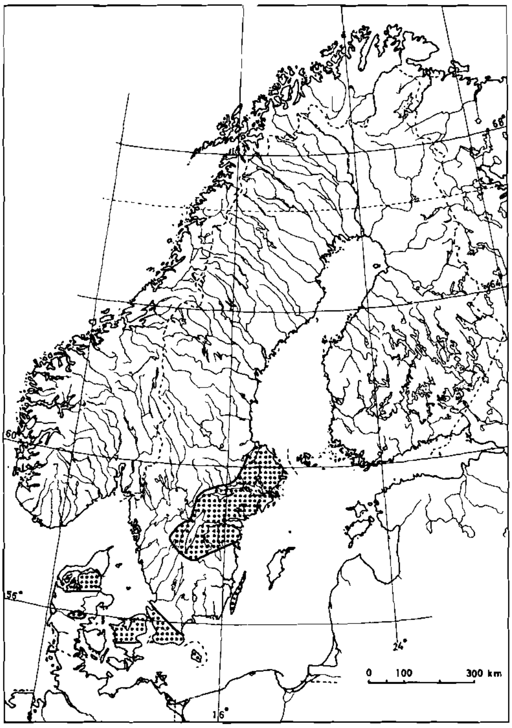

Fig. 1. Extent of attack by *Operophthera* and *Erannis* spp.

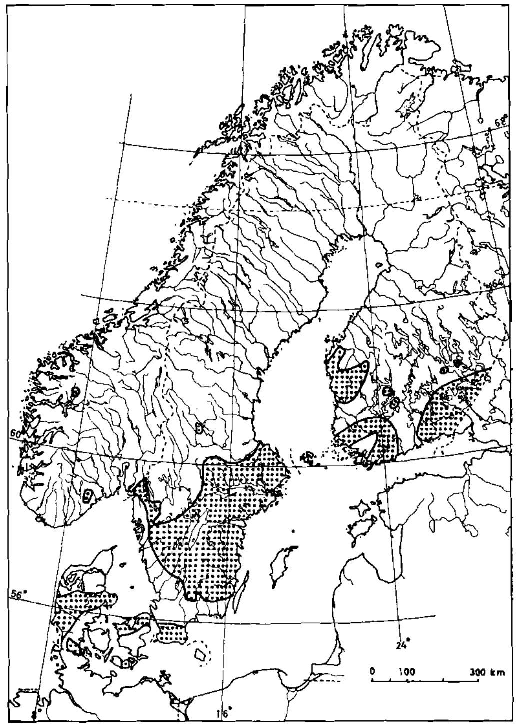

Fig. 2. Extent of attack by *Neodiprion sertifer* Geoffr.

complete and repeated defoliation in several areas has caused tree mortality. The attacks may lead to a recession of the timber-line, as demonstrated by P. Nuorteva (1963), nor can the esthetic considerations of defoliation be ignored. Since, however, the mountain birch forests are generally not exploited to any great extent, direct economic losses have been moderate in most areas.

Winter moth species, *Operophthera brumata* L., *O. fagata* Scharfenb., *Erannis defoliaria* Clerk and *E. aurantiaria* Hb., have, during the years 1964-1966, infested the deciduous forests in the south (Fig. 1). In several localities defoliation has been total, causing considerable economic losses. The oak leaf roller moth, *Tortrix viridana* L., has appeared in company with the above-mentioned species.

The European pine sawfly, *Neodiprion sertifer* Geoffr., has attacked Scotch pine forests throughout the southern parts of the area (Kangas 1963). Plantations of *Pinus contorta* in Denmark have also suffered from defoliation by this species. Fig. 2 shows the approximate extent of the attacks. Damage has been reported during all the years 1961-1966; the degree has, however, varied from year to year. Even though defoliation by *Neodiprion sertifer* seldom causes tree mortality, economic losses have become considerable, since tree increment is reduced. The nuclear polyhedrosis of the species has been studied by M. Nuorteva (1966). Both virus and chemicals have been used as control measures.

A second species of pine sawfly, *Microdiprion pallipes* Fall., has attacked young Scotch pine stands further north (Fig. 3). On account of severe defoliation and high tree mortality, especially in stands exposed to severe climatic conditions, the economic consequences have again been considerable.

In Finland, stands of Norway spruce have

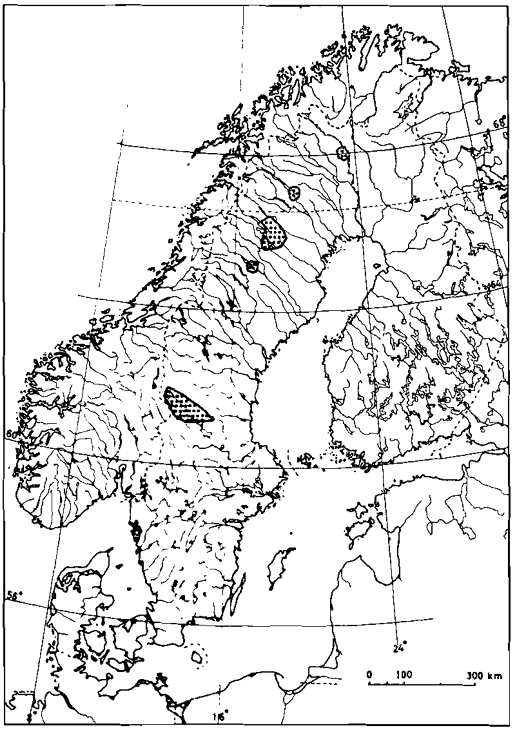

Fig. 3. Extent of attack by *Microdiprion pallipes* Fall.

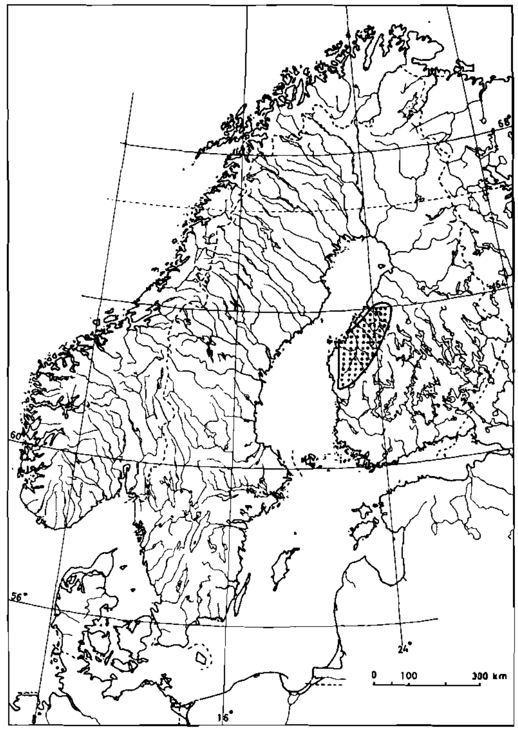

Fig. 4. Extent of attack by *Pristiphora abietina* Christ.

suffered from attacks by the sawfly *Pristiphora abietina* Christ. (Fig. 4).

OTHFP NOTEWORTHY INSECTS

In addition to the above-mentioned species, a number of other pests have attacked forest regeneration areas and tree stands throughout the area. These insects are presented in a tabular form, arranged by orders (Table I). The annual report of the Forest Insect and Disease Survey of Canada has been used as a model (Canadian Department of Fisheries and Forestry 1968).

CHRONIC INSECT PROBLEMS

Some of the species mentioned in Table I constitute chronic problems for forestry (Juutinen 1962, Kangas 1961). Population density, and thus also degree of damage, often largely depends on silvicultural measures (Kangas 1964). Examples of such species are a number of bark beetles (Scolytidae), weevils (Curculionidae) and longhorn beetles (Cerambycidae), the most important species being *Blastophagus piniperda* L., *B. minor* Hart., *Ips acuminatus* Gyll., *I. typographus* L., *Trypodendron lineatum* Ol., *Hylobius abietis* L., *Pissodes* spp., *Monochamus sutor L. and Tetropium* spp. The large pine weevil, *Hylobius abietis*, is perhaps the most important forest pest in the Nordic countries. The living conditions of this species were radically improved with the introduction of clear-cutting systems in forestry, but chemical control based on DDT is quite effective. Cooperative studies of its biology have been carried out (Nordic Forest Entomologists' Research Group 1962, Bakke & Lekander 1965).

In addition to the above-mentioned insect problems, the spruce spider mite, *Paratetranychus ununguis* Jac., is also a chronic hazard to spruce plants in nurseries.

Table I. Occurrence of other noteworthy forest insects in the Nordic countries 1961–1966

Insect species	Host(s)	Locality	Remarks	Year	Reference
HEMIPTERA					
Aradus cinnamomeus Panz.	*Pinus silvestris*	North and South Finland	Attacks reported	1962–66	
		Sweden	Attacks reported, heavy in places	1963–66	Brammanis (1965)
Cryptococcus fagi Bär	*Fagus silvatica*	South Denmark	Whole stands and single trees destroyed	1963–66	
Dreyfusia nüsslini Börner	*Abies* spp.	Denmark	Injury partly severe	1961–66	
Dreyfusia spp.	*Abies* spp.	Coastal districts of South and West Norway	Attacks reported	1961–66	
		South and Central Sweden	Injury partly severe	1961–66	
Elatobium abietinum Walk.	*Picea sitchensis*	Denmark	Needle loss considerable, trees survived	1961 1965	Bejer-Petersen (1962)
		Coastal districts of South and West Norway	Injury moderate	1961–66	
	Picea glauca	Denmark	Needle loss considerable, trees survived	1961 1965	
THYSANOPTERA					
Taeniothrips laricivorus Krat. et Farský	*Larix decidua*	Denmark	Injury severe	1966	
LEPIDOPTERA					
Bupalus piniarius L.	*Pinus silvestris*	South Sweden	Swarming locally abundant, injury light	1963	
Coleophora laricella Hbn.	*Larix* spp	Denmark, particularly Zealand	Injury severe	1964–65	Eidmann (1965 a, b)
		South Sweden	Injury severe	1964	
			Injury light	1965–66	
	Pseudotsuga taxifolia	Denmark	Damage in a nursery near a larch stand	1965	
Dioryctria abietella Schiff	*Larix leptolepis* and *Abies nobilis*	Jutland, Denmark	Damage to cones extensive	1966	
Epinotia tedella Clerk	*Picea abies*	Jutland and Falster, Denmark	Injury considerable	1961–62 1965–66	
Eriocrania sp.	*Betula* sp.	Central Sweden	Attack heavy	1961	
		Central and North Sweden	Attack considerable	1964	
Laspeyresia pactolana Zell.	*Picea abies*	Jutland, Denmark	Tree-tops killed in several localities	1961–62	
Laspeyresia strobilella L.	*Picea abies*	Most of spruce area of Norway	Seed yield heavily reduced	1961–66	Bakke (1963)
		Central Sweden	Seed yield heavily reduced	1964	

Contd.

Table I. contd.

Insect species	Host(s)	Locality	Remarks	Year	Reference
Rhyacionia buoliana Schiff.	*Pinus silvestris* and *P. contorta*	Denmark, particularly North and Central Jutland	Injury to lodge-pole pine severe. Attack on Scotch pine less heavy	1961–62	
	Pinus silvestris	Gotland and Öland Sweden	Attacks extensive, injury locally severe	1962	Eidmann & Ingestad (1963)
Tortrix viridana L.	*Quercus* sp.	Southwest Finland	Injury light in 1962, other years considerable	1961–65	
Zeiraphera diniana Guen.	*Pinus silvestris*	Central south Norway	Attack heavy in a limited area of mountain forest	1961	
DIPTERA					
Plemeliella abietina Seith.	*Picea abies*	South Norway	Seed yield reduced		
		South Finland	Injury reported	1963–64	
HYMENPTERA					
Diprion pini L.	*Pinus silvestris*	Kankaanpää West Finland	Gradation in beginning	1966	
Pristiphora laricis Hart.	*Larix sibirica*	Southeast Finland	Occurrence reported from one place	1963	
	Larix sp.	South Sweden	Attack reported	1965	
Pristiphora wesmaeli Tixch.	*Larix* sp.	South Norway	Scattered attacks		
		South and Central Sweden	Scattered attacks	1963	
COLEOPTERA					
Haltica saliceti saliceti Weise	*Quercus* sp.	South Norway	Defoliation locally severe, loss of increment	1961	
Lochmaea capreae L.	*Betula* sp.	Jutland, Denmark	Defoliation locally total	1961	
		Southeast Norway	Defoliation locally total	1961	
Luperus pinicola Duft.	*Pinus silvestris*	South Finland	Occurrence in some localities, injury considerable in one place	1966	
		North Sweden	Infestations reported	1963 1965	
Rhynchaenus fagi L.	*Fagus silvatica*	Denmark South Sweden	Population dense	1964–65	
			Population dense	1962 1964–65	
Saperda populnea L.	*Populus* spp.	Denmark	Injury local	1963	
		Norway	Scattered attacks		
		Sweden	Attacks severe in hybrid aspen	1961	Brammanis (1963)
Strophosomus rufipes Steph.	Deciduous and coniferous trees	Denmark	Injury severe in grassgrown areas	1961	

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Received 6 May 1970

Lepidoptera New to Norway Recorded in 1969

ALF BAKKE

Bakke, A. 1970. Lepidoptera New to Norway Recorded in 1969. *Norsk ent. Tidsskr. 17,* 159.

The following species were found in Norway for the first time: *Parmelina ridens* F. (Polyplocidae), *Apamea pabulatricula* Brahm. (Noctuidae), *Emmelia trabealis* Scop. (Noctuidae) and *Chesias legatella* Sciff. (Geometridae). The species were taken in light traps and all catches represent the most northern records in Scandinavia.

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In 1969 light-trap catches of Lepidoptera were started by the Norwegian Forest Research Institute to record the occurrence of important forest Lepidoptera in the southern districts of South-Norway.

Catching by light traps took place every night from 1st April until October. Four different localities in the county of Aust-Agder were chosen. on a line from the coast to about 70 km into the mountain region. The material which will be published in a few years time at the end of the investigation includes three species new to the Norwegian fauna.

Parmelina ridens F. (Polyplocidae). 1 ♂, Lyngrot, Froland. 15 May. The species is recorded in Skåne and Blekinge in Sweden (Nordström et al. 1961) and at several localities in Denmark. The new record is the most northern in Europe.

Apamea pabulatricula Brahm. (Noctuidae). 1 ♂. Lyngrot. Froland. 29 July. The species is recorded in Denmark and South Sweden, but is common only in Finland (Nordström et al. 1969).

Emmelia trabealis Scop. (Noctuidae). 1 ♂, Dömmesmoen. Fjære. 4 August. It is known from Denmark. South Sweden and South Finland (Nordström et al. 1969).

Received 30 April 1970

At Ås in the county of Akershus, light trap catches have been carried out by Sigurd-Andreas Bakke. One species new to Norway is recorded.

Chesias legatella Schiff. (Geometridae). 1 ♂, 17 October. The species is known from Denmark and South Sweden (Hoffmeyer 1966). The Norwegian record is the most northern in Europe.

ACKNOWLEDGEMENT

I am especially indebted to Mr. Sigmund Tvermyr for arranging a light trap in Lyngrot, Froland.

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Bokanmeldelser

Lyneborg. L. 1970. *Dyreliv i åker og eng.* (Norsk utgave ved B. Valum). 186 s. J. W. Cappelen, Oslo.

Denne boken danner en fortsettelse av G. Mandahl-Barth: «Dyreliv i skog og mark» som utkom i 1967. Boken omhandler den lavere fauna, hvorav insektene har fått en dominerende plass. Den inneholder 80 fargeplansjer. hvorav 68 viser et utvalg av de omtalte dyrearter, mens de øvrige viser skadesymptomer på planter angrepet av insekter, midder, m. m.

Med åker og eng menes ikke bare dyrket mark, men også udyrka grasmark, åkerreiner o.s.v. Boken tar ikke sikte på spesiell orientering om såkalte skadedyr. men på å være en felt- og oppslagsbok for folk med interesse for faunaen på de omtalte biotoper.

Da boken opprinnelig er dansk, er stoffet bearbeidet for å tilpasses norske forhold. Enkelte «glipp» har det blitt i navngiing og biologiske opplysninger, uten at dette betyr noe vesentlig for boken.

Vi hilser boken velkommen, og håper den vil bidra til å øke interessen for de små dyr i naturen.

Trygve Rygg

Geus. A. 1969. Sporentierchen, Sporozoa. Die Gregarinidae der Land- und Süsswasserbewohnenden Arthropoden Mitteleuropas. *Tierwelt Dtl. 57.* 608 pp.. 338 Figs. Gustav Fischer Verlag, Jena. Pris DM 131.30.

Parasittiske encellede dyr er et stort og vanskelig felt. At de har stor betydning er innlysende når en husker at malaria og Afrikas sovesyke skyldes encellede parasitter. Geus's bok omhandler gregarinene. en orden av sporozoer. Gregariner lever i tarmen og kroppshulen hos hvirvelløse dyr, sjelden hos hvirveldyr. Boken her er begrenset til de artene som lever i leddyr på land og i ferskvann. I Mellom-Europa er det kjent 163 arter, men det er tydelig at det finnes flere for 14 arter er kommet til under trykningen av boken. Etter en kort omtale av dyrenes bygning, forplantning, vekst, forekomst o.s.v. følger en omfattende bestemmelsestabell som ser skremmende ut. men med en del trening og hell viste det seg mulig å komme frem til rett navn på noen tilfeldige dyr. Den største del av boken er en detaljert beskrivelse av de forskjellige artenes utseende. og bygning og det som er kjent om deres biologi. Alle sammen er illustrert med meget instruktive tegninger.

Forekomsten av gregariner hos de forskjellige leddyrgruppene gir anledning til flere økologiske betraktninger som henger sammen med parasittenes mulighet til å spre seg fra en vert til en annen. De utvokste parasittene produserer sporer som går ut med vertsdyrets ekskrementer og nye dyr blir infisert når de får sporene i seg med maten de spiser. I sterkt strømmende vann har sporene små muligheter for å komme inn i en ny vert, og dyr som lever på slike steder er sjelden infisert med gregariner. Det samme gjelder dyr med munndelene omdannet til en stikkesnabel eller lignende f. eks. teger, dagsommerfugler, mygg og mange andre tovinger. Leddyr som lever i tette bestander i hus, på fuktig jord og i små dammer er ofte sterkt infisert, f. eks. kakkerlakker, biller, tusenbein.

Verten tar sjelden noe skade av parasittene, bare noen få arter kan føre til at verten blir steril. Honningbier kan en sjelden gang bli så sterkt angrepet at de dør.

Parasitter hos insekter og andre hvirvelløse dyr er lite undersøkt her i landet. Etterhvert som det kommer moderne monografier slik som denne, er det i alle fall gjort et arbeide som gjør det mulig å komme igang.

Bengt Christiansen

Tuxen, S. L. (ed.) 1970. *Taxonomist's Glossary of Genitalia in Insects.* 359 p., 248 Figs. Munksgaard, København. Pris d.kr. 200.—.

Første utgave av dette oppslagsverket ble utgitt i 1956. Siden den gang har det skjedd ganske meget på dette felt og den nye utgaven er da også vesentlig utvidet.

Boken er delt i to og Part I, Descriptions, gir en beskrivelse av genitalorganenes bygning hos 29 insektordener. Figurene er meget gode og tydeligere og langt flere enn i første utgave, imidlertid er figurteksten plassert i slutten av hvert kapitel og ikke under eller ved siden av figurene. Dette gjør boken noe tung å bruke. De enkelte ordener er behandlet av vår tids fremste spesialister. Alle kapitlene er reviderte eller omskrevet av de opprinnelige forfattere eller av nye når de opprinnelige forfattere er døde.

Part II, behandler de morfologiske betegnelser som har tilknytting til insektenes genitalier, med henvisning til den ordenen de er brukt, og til forfatter og årstall. Ofte blir det også gitt forklaring på de enkelte organers funksjon. I stor utstrekning er det tatt med synonymer. Dette er svært nyttig, det vet enhver som har brukt litteratur fra forskjellige forfattere i sitt arbeide. Også denne del av boken er utvidet i den nye utgave.

Dette verket må vel sies å være uunnværlig for alle som arbeider med insektsystematikk på genitalier.

Albert Lillehammer

Fjelddalen, J. og Ramsfjell, T. 1969. *Sykdommer og skadedyr på jordbruksvekster.* Landbruksforlaget, Oslo. Pris kr. 65.—.

Forskningsinnsatsen har økt betydelig innen den anvendte entomologi i Norge i det siste decennium. Dette skyldes i stor utstrekning det arbeidet som er utført ved Statens Plantevern, hvor en stab av entomologer gjennom en rekke publikasjoner, har gitt oss nye kunnskaper om skadeinsektenes biologi, utbredelse og betydning i vårt land. Arbeidene er ofte publisert i forskjellige tidsskrifter, både norske og utenlandske. Det er derfor ønskelig og meget verdifullt at de nyere forskningsresultatene med visse tidsrom samles og innarbeides i håndboklitteraturen.

Denne boken er en revidert utgave av en bok som kom ut i 1962. Spesialister fra forskjellige grener av plantevernets fagområder, har gått sammen om å fremstille forskningsresultatene i en form som passer best for de som skal utnytte resultatene. Boken inneholder derfor stoff om de viktigste sykdommer og skadedyr på jordbruksvekstene. Den omhandler parasittære sykdommer forårsaket av sopp og bakterier, virussykdommer, fysiogene sykdommer og skader; men en vesentlig del av boken er viet skadedyrene, og da i første rekke insektene. For hver sykdom og hvert skadedyr, er det gitt råd om forebyggende tiltak eller bekjempelse.

Boken er laget som håndbok for norske jordbrukere, og tar derfor med entomologisk stoff som særlig har interesse for dem. Fra et entomologisk synspunkt er det omtalen av de enkelte insektartene som er av størst interesse. Der finner vi en kort beskrivelse av skadedyret, sammen med en oversikt over levemåte, utbredelse og den skaden som oppstår. Sist i boken finnes et utmerket plansjeverk i farger med 112 plansjer som i første rekke viser skadesymptomer, men også de insektene som er årsak til skadene.

For dem som ønsker å skaffe seg et bilde av insektenes betydning for vårt jordbruk, vil boken være den viktigste og beste kilde.

Alf Bakke

ERRATA

Vol. 16, No. 2, 1969.

In the paper 'Turnbull and Nicholls' "Quick Trap" for Acquiring Standing Crop of Evertebrates in High Mountain Grassland Communities' by Hans Kauri, Tore Moldung, and Torstein Solhöy, the following figures should be corrected:

p. 133, abstract	71%	not	84%
p. 135, first column	71.4	not	84.4
p. 135, second column	12,019	not	10,177

Vol. 17, No. 1, 1970.

p. 17, abstract. Read Andersen. J. 1970, not 1969.

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Whitman, L. 1951. The arthropod vectors of yellow fewer, pp. 229-298 in Strode, K. (ed.). *Yellow Fever.* McGraw-Hill, New York and London.

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