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Coleoptera i rovfuglreir

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(Mottatt 25. Januar 1967)

Cand. mag. Ivar Mysterud, Oslo har under sine rovfuglundersøkelser vært så elskverdig å la meg fa gå gjennom reirmateriale som han har samlet inn, og ta de biller som materialet inneholdt. Det gjelder samtlige nevnte reir med unntak av fiskeørnreir nr. 1, vepsevåkreir nr. 1 og 2, og jorduglereiret. Materialet fra fiskeørnreiret har jeg fått av jeger Inge Fuglenes, fra vepsevåkreirene av Dr. Yngvar Hagen, og materialet fra jorduglereiret har jeg tatt selv.

Materialet har ikke vært tatt med sikte på kvantitative undersøkelser av billefaunaen, det er nærmest å betrakte som mer eller mindre omfattende stikkprøver. Reirene og de biller som ble funnet i dem er følgende:

MUSVÅK (*Buteo buteo* L.) (Tabell I)

Reir nr. 1. AK: Trehørningen, Nordmarka, 5/7 1962. Reiret lå i en bergvegg ca. 450 m o. h.

Reir nr. 2. Os: Katnosa, Nordmarka, Lunner, 14/7 1962. Reiret lå 7 m over bakken i en gran i grov, gammel granskog ca. 550 m o. h.

Reir nr. 3. Bø: Oppkuven, Nordmarka, Norderhov, 10/7 1962. Reiret lå i en tørrgran ca. 17 m over bakken, 510 m o. h.

Reir nr. 4. AK: Slora, Sørkedalen, 26/8 1962. Reiret lå i et løvtre 9 m over bakken i frodig blandingsskog ca. 400 m o. h. Materialet var meget vått.

Reir nr. 5. Bø: Svarten, Norderhov, 16/9 1962. Reiret lå i en bergvegg ca. 480 m o. h. Ungene forlot reiret ca. midten av juli.

Reir nr 6. Bø: Langlia, Norderhov, 16/9 1962. Reiret lå i en bergvegg ca. 470 m o. h. i frodig blandingsskog. Ungene forlot reiret noe før midten av juli. Materialet var meget vått.

Reir nr. 7. AK: Heikampen, Oslo, 8/7 1963. Reiret lå ca. 5 m over en ur i en bratt bergvegg ca. 450 m o. h. Granskog i omegnen.

TABELL 1. Biller funnet i reir av musvåk (*Buteo buteo*)

	Antall eksemplarer i reir nr.									
	1	2	3	4	5	6	7	8	9	10
Cercyon impressus Sturm	1									
Catops nigrita Er.				1						
coracinus Kelln.	1									
tristis Panz.					1					
alpinus Gyll.	4									
Sciodrepoides watsoni Spence	1									
Pteryx suturalis Heer							1			
Acrotrichis grandicollis Mnh.						1	1			
intermedia Gillm.		1		3	2	3	5	2	4	
rugulosa Rossk.	12				3	6	29		2	1
fascicularis Hbst.									2	
silvatica Rossk.	1				2	2	1		1	
dispar Matth.					1					
Megarthrus sinuaticollis Lac.	2				1					
nitidulus Kr.	5	8								
Phyllodrepa melanocephala Th.				1						
nigra Gr.					1					
pygmaea Gyll.				1					1	
Omalium septentrionis Th.	11									
strigicolle Wank.	59					1				
Deliphrum tectum Payk.		2								
Oxytelus laqueatus Mars.	1									
Lathrobium fulvipenne Gr.	1								1	
brunnipes F.	1									
Philonthus politus L.		2			1					
longicornis Steph.					1					
varians Payk.							1			
cephalotes Gr.		1								
nigriventris Th.					1	1	2		1	
Quedius maurus Sahlb.					2	1				
limbatus Heer					2					
Tachinus laticollis Gr.						2			3	
Bolitochara lunulata Payk.	1									
Sipalia circellaris Gr.					4					
Atheta sodalis Er.						1				
subtilis Scriba	4									
nigra Kr.										1
nigricornis Th.	2	2	9	1	4	1		1		2
nidicola Johans.			9					7		
myrmecobia Kr.									1	
crassicornis F.	1						1			
cinnamoptera Th.	3									
cribripennis J. Sahlb.							1			
fungi Gr.							1			
orbata Er.						1				
Microglotta picipennis Gyll.	[1])	[1])	15	1			[1])	2		
Gnathoncus nanus Scriba		2								
buyssoni Auzat		4								
Carcinops quatuordecimstriata Steph.								2		
Hister merdarius Hoffm.									1	
Omosita depressa L.	1	1								
Cryptophagus lapponicus Gyll.	1									
scanicus L.	1									
Atomaria apicalis Er.					1					

[1]) Tallrik.

Reir nr. 8. Bø: Sandungen, Norderhov, 28/8 1963. Reiret lå i en gran 12 m over bakken i granskog ca. 600 m o. h. Ungene hadde forlatt reiret i begynnelsen av juli.

Reir nr. 9. Bø: Svarten, Norderhov, 28/8 1963. Som nr. 5.

Reir nr. 10. VE: Seterdalsåsen, Langangen, 2/8 1964. Reiret lå i en delvis tørr eik i blandingsskog ca. 200 m o. h.

FJELLVÅK (*Buteo lagopus* Pont.) (Tabell II)

Reir nr. 1. Bø: Oppkuven, Nordmarka, Norderhov, 13/7 1962. Reiret lå i en bergvegg i frodig blandingsskog ca. 550 m o. h.

Reir nr. 2. Bø: Spålen, Nordmarka, Norderhov, 15/7 1962. Reiret lå i en bergvegg i frodig blandingsskog ca. 600 m o. h.

Reir nr. 3. Bø: Heggelia, Nordmarka, Norderhov, 16/7 1962. Reiret lå i en steil bergvegg 10 m høyt og ca. 550 m o. h.

Reir nr. 4. AK: Helgeren, Nordmarka, 24/7 1962. Reiret lå i en bergvegg i grov granskog ca. 450 m o. h.

Reir nr. 5. Bø: Storflåtan, Nordmarka, Norderhov, 5/8 1962. Reiret lå i en bergvegg ca. 580 m o. h.

Reir nr. 6. Samme reir som nr. 2, 5/8 1962.

Reir nr. 7. Samme reir som nr. 1, 26/8 1962. Lite materiale.

Reir nr. 8. Samme reir som nr. 3, 26/8 1962. Lite og vått materiale.

TABELL II. Biller funnet i reir av fjellvåk (*Buteo lagopus*)

	Antall eksemplarer i reir nr.							
	1	2	3	4	5	6	7	8
Catops coracinus Kelln.				1	1	1		
tristis Panz.					1			2
alpinus Gyll.				2	4	1		
Sciodrepoides watsoni Spence					1			
Acrotrichis intermedia Gillm.				1	1			
rugulosa Rossk.	24	2	1	16	17		1	
silvatica Rossk.					6			
Megarthrus nitidulus Kr.	2			6	1			
Proteinus crenulatus Pand.					1	1		
brachypterus F.					12	1		3
Omalium rivulare Payk.								1
strigicolle Wank.				1	7			
rugatum Rey					3	2		
Deliphrum tectum Payk.				2	21			
Oxytelus laqueatus Mars.						1		
Philonthus nigriventris Th.	2	1						
Tachinus proximus Kr.					1			
pallipes Gr.					3	1		
laticollis Gr.	1				1			

Tabell II (fortsatt).

TABELL II. Biller funnet i reir av fjellvåk (*Buteo lagopus*)

	Antall eksemplare i reir nr.							
	1	2	3	4	5	6	7	8
Atheta corvina Th.	2							
excellens Kr.			1		3			
subtilis Scriba		1			1		1	9
celata Er. (*arenicola* Th.)				1	3	2		
nigra Kr.			1					
nigricornis Th.	1	2						
harwoodi Will.	2							
divisa Märk.	1							
crassicornis F.					3			
diversa Sharp					1	1		
picipennis Mnh.					10	9		
cinnamoptera Th.					3			
allocera Epp.	1	1						
intermedia Th.					1			
atramentaria Gyll.					4	1		
cribripennis J. Sahlb.				1				
parvula Mnh.						2		
fungi Gr.		2				1		
Microglotta picipennis Gyll.	[1])	20	[1])	[1])	[1])	10	1	
Oxypoda nigricornis Mtsch.					2			
Cryptophagus scanicus L.		1	3					

[1]) Tallrik.

SPURVEHAUK (*Accipiter nisus* L.) (Tabell III)

Bø: Hornet, Norderhov, 16/7 1959. Reiret lå 10 m over bakken i et grantre i en granskog ca. 420 m o. h.

TABELL III. Biller funnet i reir av spurvehauk (*Accipiter nisus*)

	Antall eksemplarer
Atheta nigricornis Th.	4
crassicornis F.	1
Microglotta pulla Gyll.	1
picipennis Gyll.	tallrik
Cryptophagus acutangulus Gyll.	1
lapponicus Gyll.	1
scanicus L.	12
Enicmus nidicola Palm	1

HØNSEHAUK (*Accipiter gentilis* L.) (Tabell IV)

Reir nr. 1. AK: Slora, Sørkedalen, 16/7 1959. Reiret lå 12 m over bakken i en grovstammet gran i grov, gammel granskog ca. 360 m o. h.

Reir nr 2. AK: Svarten, Norderhov, 18/6 1965. Reiret lå 13 m over bakken i en gran i grovstammet granskog ca. 500 m o. h.

Reir nr. 3. AK: Nittedal, 30/6 1965. Reiret lå 12,5 m over bakken i en gran i gammel, grovstammet granskog ca. 150 m o. h.

Reir nr. 4. AK: Sandungen, Oslo, 27/6 1966. Reiret lå i en gran 22 m over bakken i en gammel barskog ca. 400 m o. h. Det inneholdt to halvstore unger.

TABELL IV. Biller funnet i reir av hønsehauk (*Accipiter gentilis*)

	Antall eksemplarer i reir nr.			
	1	2	3	4
Omalium strigicolle Wank.		1		
Leptusa ruficollis Er.	1			
Atheta nigricornis Th.		9	1	
nidicola Johans.	5			
myrmecobia Kr.	1			
crassicornis F.		1		
Microglotta picipennis Gyll.	[1]	[1]	[1]	[1]
Gnathoncus nannetensis Mars.		1		
buyssoni Auzat	3	1	1	
Cryptophagus lapponicus Gyll.	1			
badius Sturm	4		1	
scanicus L.	10	1		
Atomaria morio Kol.	1			
Enicmus nidicola Palm	5			

[1]) Tallrik.

VEPSEVÅK (*Pernis apivorus* L.) (Tabell V)

Reir nr. 1. VE: Stokke, 21/8 1952.

Reir nr. 2. HEn: Tenåsen, Trysil, 12/7 1953.

Reir nr. 3. Bø: Brennåsen, Hole, 25/7 1959. Reiret lå 11,5 m over bakken i grovvokst granskog ca. 340 m o. h.

Reir nr. 4. Samme reir som nr. 3, 3/8 1959.

Reir nr. 5. AK: Seterstøa, Nes, 7/9 1963. Reiret lå 10 m over bakken i en gran i blandingsskog av gran og furu 250 m o. h. Ungene hadde nettopp forlatt reiret.

Reir nr. 6. AK: Movatn, Nittedal, 30/6 1965. Reiret lå 13 m over bakken i en gran i grovstammet granskog ca. 250 m o. h.

TABELL V. Biller funnet i reir av vepsevåk (*Pernis apivorus*)

	Antall eksemplarer i reir nr. 1	2	3	4	5	6
Atheta corvina Th.				1		
nigricornis Th.					2	1
crassicornis F.					1	
Microglotta picipennis Gyll.	[1]	[1]	[1]	[1]	[1]	15
Aleochara sparsa Heer	1					
Gnathoncus buyssoni Auzat		5			2	
Cryptophagus lapponicus Gyll.			1		5	
scanicus L.			4	10	4	
Enicmus nidicola Palm		1			1	
Corticarina obfuscata A. Str.					1	

[1]) Tallrik.

FISKEØRN (*Pandion haliaëtus* L.) (Tabell VI)

Reir nr. 1. Bø: Heggelivann, Nordmarka, Norderhov, 14/8 1954.

Reir nr. 2. Os: Katnosa, Nordmarka, Lunner, 11/7 1961. Reiret lå i en gran 26 m over bakken ca. 560 m o. h.

Reir nr. 3. Bø: Heggelia, Norderhov, 13/7 1962. Reiret lå i en furu 16 m over bakken i blandingsskog ca. 550 m o. h.

Reir nr. 4. Bø: Heggelia, Norderhov, 12/7 1963. Samme reir som nr. 3.

Reir nr. 5. Bø: Spålen, Norderhov, 16/7 1964. Reiret lå i en furu 15 m over bakken ca. 550 m o. h.

Reir nr. 6. Bø: Trehørningen, Hole, 28/6 1966. Reiret lå i en furutopp 16 m over bakken ca. 400 m o. h. Det var tre små unger i reiret.

TABELL VI. Biller funnet i reir av fiskeørn (*Pandion haliaëtus*)

	Antall eksemplarer i reir nr. 1	2	3	4	5	6
Acrotrichis intermedia Gillm.				1		
rugulosa Rossk.				5		
Xylodromus concinnus Mars.	1					
Oxytelus nitidulus Gr.	1					
Philonthus politus L.	1					
chalceus Steph.				1		
nigriventris Th.				1		
Atheta nigricornis Th.	2	4	1	19		1
nidicola Johans.	2	21		1		4
crassicornis F.	1					
pandionis Scheerp.	1					
Microglotta picipennis Gyll.	[1]	[1]	[1]	[1]	12	[1]
Gnathoncus nanus Scriba			1			
Carcinops quatuordecimstriata Steph.				4		
Enicmus minutus L.	1					
Corticaria pubescens Gyll.	1					
Otiorrhynchus desertus Rosh.	1					

[1]) Tallrik.

TÅRNFALK (*Falco tinnunculus* L.) (Tabell VII)

AK: Dysterud, Nes, 6/7 1962. Reiret lå i et gammelt kråkereir 11 m over bakken i en furu nær dyrket mark.

TABELL VII. Biller funnet i reir av tårnfalk (*Falco tinnunculus*)

	Antall eksemplarer
Sciodrepoides fumata Spence	1
Phyllodrepa nigra Gr.	8
Deliphrum tectum Payk.	1
Philonthus nigriventris Th.	1
Atheta celata Er. (*arenicola* Th.)	2
nigricornis Th.	62
harwoodi Will.	9
nidicola Johans.	11
Gnathoncus nannetensis Mars.	1
buyssoni Auzat	1
Carcinops quattuordecimstriata Steph.	1
Enicmus nidicola Palm	1

SNØUGLE (*Nyctea scandiaca* L.) (Tabell VIII)

Reir nr. 1. HOi: Langvasshaldet, Hardangervidda, Eidfjord, 17/7 1963. Reiret lå på en sandet rygg på bakken ca. 1230 m o. h.

Reir nr. 2. HOi: Sydvest for Langavatn, Hardangervidda, Eidfjord, 19/7 1963. Reiret lå på bakken i steinet terreng ca. 1320 m o. h.

Reir nr. 3. Samme sted som nr. 2.

Reir nr. 4. HOi: Nordvatn, Hardangervidda, Eidfjord, 19/7 1963. Reiret lå på en stor haug bevokst med lav og gras ca. 1250 m o. h.

TABELL VIII. Biller funnet i reir av snøugle (*Nyctea scandiaca*)

	Antall eksemplarer i reir nr.			
	1	2	3	4
Thanatophilus lapponicus Hbst.	[1])	[1])	[1])	[1])
Arpedium tenue Lec.		1		
Atheta depressicollis Fauv.				3
munsteri Bernh.	2	5	1	
atramentaria Gyll.			1	

[1]) Flere larver (det. Thure Palm).

SPURVEUGLE (*Glaucidium passerinum* L.) (Tabell IX)

Reir nr. 1. AK: Fallet, Nes, 23/8 1964. Reiret lå i et hull i en osp 4,7 m over bakken ca. 250 m o. h. Den siste ungen forlot reiret 6/7 1964.

Reir nr. 2. AK: Fallet, Nes, 30/8 1965. Reiret lå i et hull i en osp 7,1 m over bakken i granskog ca. 250 m o. h. Den siste ungen forlot reiret 20/6 1965. Eksemplaret av *Microglotta pulla* Gyll. ble funnet i fjørdrakten hos en unge.

Reir nr. 3. AK: Høldippeldalen, Nittedal, 23/5 1966. Materialet var en spurveugles vinterlager i et gammelt svartspetthull i en brukket tørrfuru, 3.5 m over bakken ca. 270 m o. h. Hullet var, da materialet ble tatt, tilholdssted for en perleugle.

TABELL IX. Biller funnet i reir av spurveugle (*Glaucidium passerinum*)

	Antall eksemplarer i reir nr. 1	2	3
Nemadus colonoides Kr.	24		
Philonthus fuscus Gr.			1
Quedius brevicornis Th.	3	1	
Atheta nigricornis Th.	26		23
Microglotta pulla Gyll.		1	
Gnathoncus nannetensis Mars.			4
buyssoni Auzat	4		
Dendrophilus punctatus Hbst.	1		
Carcinops quatuordecimstriata Steph.	7	4	
Hister merdarius Hoffm.	1		
Trox scaber L.	2	1	19

JORDUGLE (*Asio flammeus* Pont.) (Tabell X)

On: Vålasjø, Dovre, 10/7 1963. Reiret lå på en grasbakke nær et vann ca. 940 m o. h. Ungene hadde nylig forlatt reiret.

TABELL X. Biller funnet i reir av jordugle (*Asio flammeus*)

	Antall eksemplarer
Catops coracinus Kelln.	1
Omalium septentrionis Th.	1
Deliphrum tectum Payk.	2
Anthophagus alpinus F.	1
Quedius boopoides Mnst.	1
Atheta depressicollis Fauv.	5
brunneipennis Th.	1
picipennis Mnh.	5
altaica Bernh.	12
munsteri Bernh.	25
Oxypoda nigricornis Mtsch.	1
Aleochara moerens Gyll.	2

PERLEUGLE (*Aegolius funereus* L.) (Tabell XI)

Reir nr. 1. Taraldrudåsen, Maridalen, 29/8 1958. Reiret lå i en furu 300 m o. h.

Reir nr. 2. AK: Høgåsen, Nes, 24/6 1963. Reiret som lå i en tørr osp 4,5 m over bakken og 336 m o. h., var et gammelt reir av svartspett (*Dryocopus martius* L.), hvor perleuglen hadde unger i 1962, men som var ubebodd da reiret ble tatt. Det ble opplyst at reiret innehold et rikt billemateriale, men det ble bare tatt vare på en liten del av det.

Reir nr. 3. AK: Mo, Nittedal, 23/5 1966. Materialet tatt i en holk hengt opp i en gran 5 m over bakken ca. 140 m o. h. Ungene hadde forlatt holken.

TABELL XI. Biller funnet i reir av perleugle (*Aegolius funereus*)

	Antall eksemplarer i reir nr.		
	1	2	3
Acrotrichis rugulosa Rossk.	1		
Philonthus politus L.	2		
Atheta sodalis Er.	1		
canescens Sharp			1
nigricornis Th.	8		71
Microglotta picipennis Gyll.			1
Aleochara sanguinea L.	1		
Gnathoncus nanus Scriba			29
nannetensis Mars.		1	4
buyssoni Auzat		1	1
schmidti Rtt.	1	3	2
Carcinops quatuordecimstriata Steph.	2	1	56
Hister merdarius Hoffm.		1	9
Trox scaber L.		1	

DISKUSJON

Hicks (1961, 1962) har gitt en oversikt over alle funn av insekter i fuglereir som han hadde kjennskap til. Av de nevnte fuglearter har han overhodet ikke med fjellvåk og snøugle, fra fiskeørnreir og spurveuglereir er tidligere ikke kjent noen biller, og fra jorduglereir er av biller bare kjent de arter som Strand (1943) har oppgitt tidligere.

Av de billearter som er nevnt foran, er ifølge Hicks (1961, 1962) følgende ikke tidligere kjent fra fuglereir:

Pteryx suturalis Heer
Acrotrichis dispar Matth.
Thanatophilus lapponicus Hbst.
Megarthrus nitidulus Kr.
Proteinus crenulatus Pand.
Tachinus laticollis Gr.
Bolitochara lunulata Payk.
Atheta myrmecobia Kr.
pandionis Scheerp.
brunneipennis Th.

Omalium rugatum Rey
Deliphrum tectum Payk.
Arpedium tenue Lac.
Anthophagus alpinus F.
Lathrobium fulvipenne Gr.
Philonthus longicornis Steph.
  varians Payk.
Quedius limbatus Heer
  boopoides Munst.
  allocera Epp.
  cribripennis J. Sahlb.
Oxypoda nigricornis Mtsch.
Gnathoncus schmidti Rtt.
Omosita depressa L.
Corticarina obfuscata A. Str.
Otiorrhynchus desertus Rosch.

Av disse er *Atheta pandionis* overhodet bare kjent i 3 eksemplarer fra fiskeørn- og musvåkreir, ingen av de andre er typiske reirdyr, bortsett fra *Gnathoncus schmidti*, som sannsynligvis finnes blant Hicks *G. rotundatus.*

Som det framgår av det foran nevnte, er en del av musvåkreirene tatt i trær og en del i bergvegger. Ved å sammenlikne utbyttet fra disse to reirkategoriene er det iøynefallende at reirene fra bergveggene inneholdt et betydelig større antall arter enn reirene fra trær, men samtidig inneholdt reirene fra trær mer typiske reirdyr, deriblant flere arter som manglet i reirene fra bergvegger. Dette gjelder således *Atheta nidicola* og alle Histeridene, som overhodet ikke ble tatt i reir fra bergveggene.

Den mest typiske art for hauke-, våk- og fiskeørnreirene er *Microglotta picipennis*, som for det meste opptråtte i svære mengder. Den manglet helt i uglereirene, bortsett fra et eksemplar som ble tatt i et perleuglereir.

Enicmus nidicola, som er en typisk reirart, og som er funnet hos en rekke fuglearter og i ekornbol, forekom sparsomt i falke-, hauke- og vepsevåkreirene, derimot ikke i de andre reirene. Hicks nevner at denne arten, som er beskrevet av Palm (1944), er ukjent for ham, og det eneste funn han nevner er fra haukereir på grunnlag av min artikkel (Strand, 1946). Derimot har han den nærstående *minutus* fra en rekke reir. En stor del av disse gjelder sikkert *nidicola.*

SUMMARY

Coleoptera in nests of birds of prey

An account is given of finds of Coleoptera in nests of birds of prey in some Norwegian localities (see Tables I to XI).

The author points out that according to Hicks (1961, 1962) Coleoptera have not earlier been found in nests of *Buteo lagopus* Pont., *Pandion haliaëtus* L., *Glaucidium passerinum* L., and *Nyctea scandiaca* L., while in nests of *Asio flammeus* Pont. only the species which the author (Strand 1943) has published earlier have been found.

A list is also given of Coleoptera which, according to Hicks (1961, 1962), have not earlier been found in birds' nests.

As regards *Enicmus nidicola* Palm, which Hicks (1961, p. 147) places under the title 'Uncertain Position in the Order Coleoptera', reference is made to Palm (1944). The species, which is not uncommon in nests of various birds, has no doubt been confused with *E. minutus* L.

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Emergence Periods and Population Fluctuations of the Frit Fly *Oscinella frit* L. (Dipt.: Chloropidae) in Norway

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INTRODUCTION

Although the frit fly (*Oscinella frit* L.) in Norway is a common inhabitant of grasses and in some years causes severe damage to cereals (Schøyen, W. M. 1896, 1898, Schøyen, T. H. 1919, 1920, 1934) little has hitherto been done to investigate its biology.

The main aim of the present investigation has been to study the generation cycles of the frit fly, especially the emergence periods of the imagines, and the population fluctuations of adult frit flies in the field. The work was carried out at Ås during the years 1961–63.

As the number of generations varies with years and localities, the generations are termed as the overwintering, spring, and summer generations, respectively.

MATERIAL AND METHODS

The data on emergence periods are based on material collected at Ås and other localities in the south-eastern parts of the country with similar climatic conditions. The material concerning adult population fluctuations comprises imagines caught in sweep-nets and in water traps. Catches were made regularly at Ås and irregularly at other places.

Emergence of imagines was observed outdoors using wooden boxes provided with glass tubes (Rygg 1966). In the spring, the boxes were set out in fields of winter rye and timothy ley. Twice a week the boxes were moved to new positions to avoid wilting of the plants. In the summer, infested plants were collected and planted in flower pots placed in the ground underneath an emergence box. The plants were collected when most larvae were fully grown and some had already pupated. Emerged flies were collected every day except Sundays.

Insect sampling in the field was done by sweeping and trapping. A sweep-net, 30 cm in diameter, was passed in a straight line for a distance of 80 m at vegetation level. Sweeping was made in a field of permanent short grass, in timothy ley and in spring-sown wheat. Regular sweepings were made at 1400 hours G.M.T., on alternate days, three times a week. In the event of rainfall on one of these days, the sweeping was postponed until the following day. Simultaneously the wind speed 1.0 m above ground level was measured with an anemometer. For temperature figures, the reading at the meteorological station at Ås were used.

For continuous sampling, coloured water traps were used, adopting the method of Mayer (1961). Blue was the standard colour, but in comparative tests other colours were tried. The trapping sites were in the same short-grass field as mentioned above, and in oats plots with plants in different growth stages. Each set of traps comprised three replicates, emptied three times per week.

Plots of oats, 14 × 7 m, were sown with a ten- to fourteen-day interval between each sowing. In 1962, plots were sown at three sites about 1000 m apart, the other years at one site only. These plots also provided *O. frit* infested plants for the study of the generation cycles. In order to restrict the periods of oviposition, parts of the plots were exposed for egg-laying for one week only when the plants were in the 2–4 leaf stage. Afterwards these plots were for two weeks covered with cages, consisting of wooden frames 60 × 40 × 50 cm covered with gauze. This covering procedure was especially important at times when the same plants might be infested with flies belonging to different generations.

In order to study the overwintering generation, plots of winter rye were sown in August.

Growth states of the plants are referred to after the Feekes scale (Large 1955).

Meteorological data from Ås are given in Table I.

TABLE I. Mean temperature in °C at Ås 1961–63

	May	June	July	August	September	Total of day degrees May–Sept.
1961	10.3	15.2	15.6	13.4	11.7	2025
1962	7.8	12.7	14.1	12.6	9.7	1742
1963	10.2	15.6	15.2	15.2	10.6	2044
Mean 1921–50 ...	9.9	13.9	16.8	15.3	10.8	2043

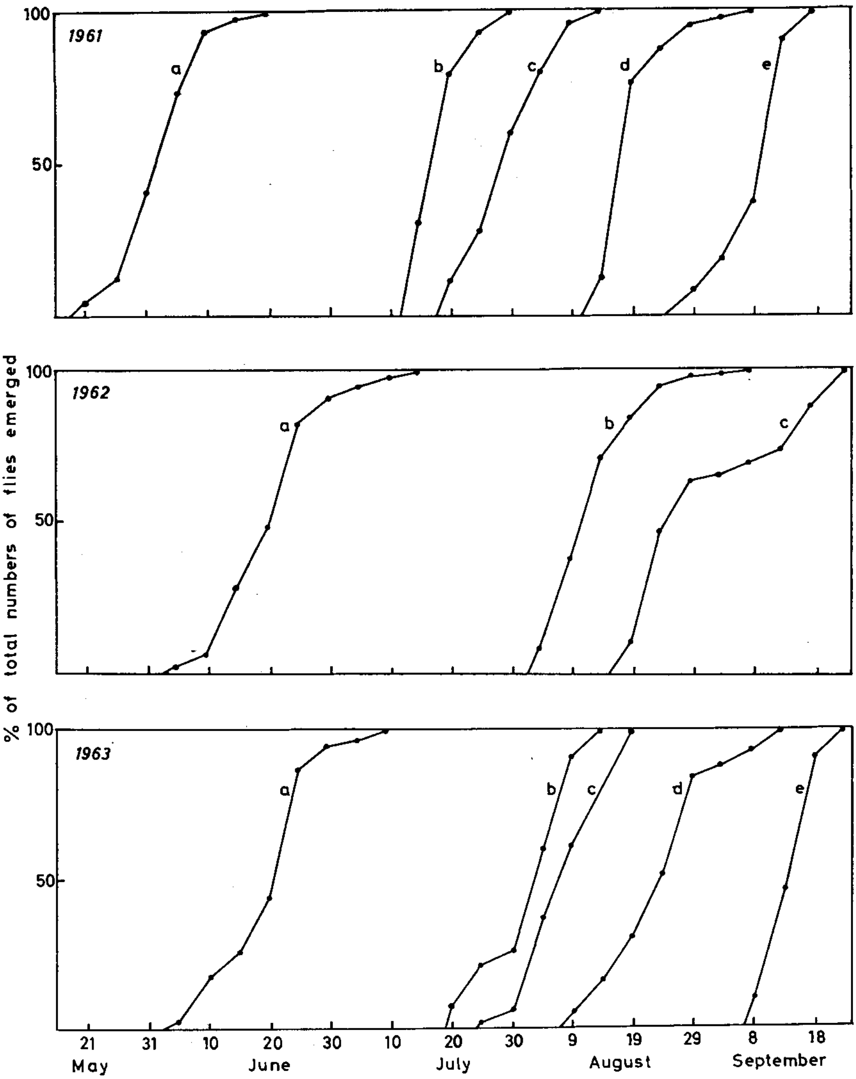

Fig. 1. Emergence periods of *Oscinella frit* L. at Ås in the years 1961–63. Explanation of the curves: a = flies of the overwintering generation, b, c and d = flies of the spring generation developed in plots sown at different dates, and e = flies of the summer generation.

Sowing dates for the plots:

		b	c	d	e
	1961	20.V	1.VI	20.VI	12.VII
	1962	30.V	18.VI		
	1963	1.VI	12.VI	25.VI	8.VII

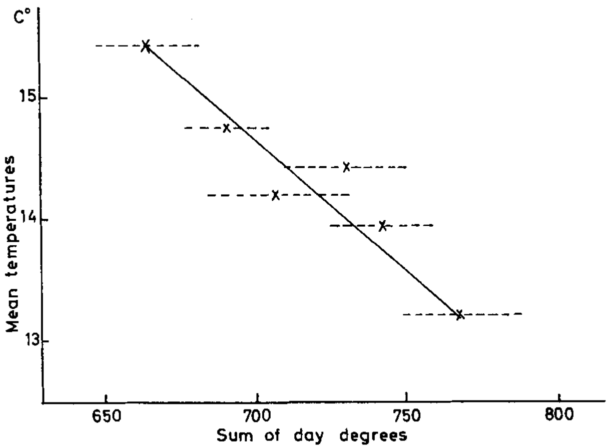

Fig. 2. Sum of day degrees (mean $\pm$ s.d.) required for the development of a complete generation of *Oscinella frit* L. at different temperatures during development.

RESULTS

Emergence periods

The data on emergence periods are given in Fig. 1. The curves *a* describe the emergence period of flies developed in winter rye and timothy plants. No differences in emergence were observed from the two kinds of host plants. The earliest record of emergence is from 1961, when the first fly appeared on 19 May. Most flies emerged in the course of ten to twenty days, though there were some latecomers. In spite of this, there was a gap between the emergence of the overwintering and that of the spring generations.

The curves *b* in Fig. 1 show the emergence periods of flies from oats plots which, in the respective years, were the first to be infested. These flies were the most uniform as to time of development. The curves *c* and *d* in Fig. 1 show the emergence periods of flies raised from plants in plots sown later.

In 1961 the frit fly developed three generations, and imagines of the summer generation emerged from 26 August onwards. These flies originated from plots sown on 12 July. Larvae in oats plants sown on 25 July, however, did not pupate in the autumn. In 1963 only 13 flies of the summer generation emerged, with the first fly appearing on 6 September and originating from plots sown on 8 July. No summer generation flies appeared in 1962.

To complete a life-cycle in the summer under field conditions at Ås, the frit fly needed an average of 722 ±83 day degrees at a mean temperature of 14.3°C, but the day degrees requirement, as measured above zero, was

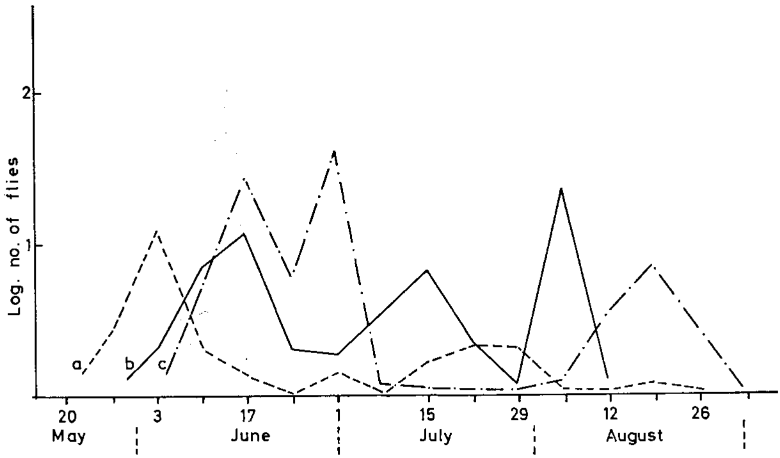

Fig. 3. Sweep-net catches of *Oscinella frit* L. in summer wheat at Ås. Curve a: 1961, c: 1962, b: 1963.

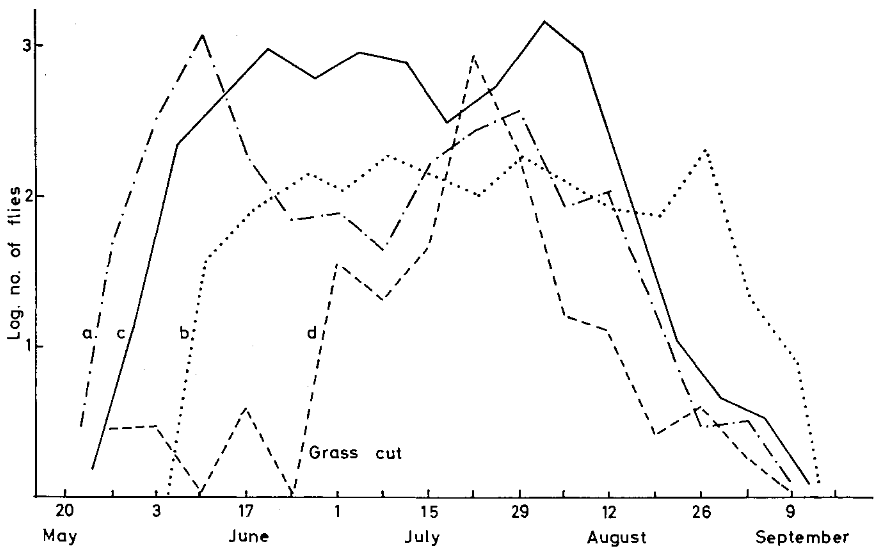

Fig. 4. Sweep-net catches of *Oscinella frit* L. in a permanent short grass field and in timothy ley. Curves a, b and c: short grass 1961, 1962 and 1963, respectively. Curve d: timothy ley 1961.

significantly correlated with the actual temperature (Fig. 2). These data refer to larval development in oats plants infested with eggs in the 2–4 leaf stage. For a laboratory culture bred on young plants at 22°C, the sum of day degrees for the fulfilment of a generation was 668 ±63°C.

Population fluctuations

The results of the sweepings are shown in Figs. 3 and 4. In the wheat fields there was a marked peak in early summer, while the wheat plants were still in the tillering stage. A second and smaller peak in July—August followed the emergence of the spring generation flies. An additional third peak was apparent in the middle of July 1963, which cannot be related to the emergence of a new generation or to an attractive growth stage of the plants. The catches from the timothy ley in 1961 were poor until the grass was cut on 26 June, when the population increased rapidly and reached its maximum during the week following the incipient emergence of the spring generation. In the field of permanent short grass, frit flies were swept in great numbers, although the catches were less fluctuating than in the fields of ley and summer wheat. The curves from short grass in 1962 and 1963, however, have two distinct peaks coinciding with the emergence of the overwintering and spring generations.

Altogether the sweep-net catches comprised 23,675 *O. frit* specimens, 51.6% of which were females.

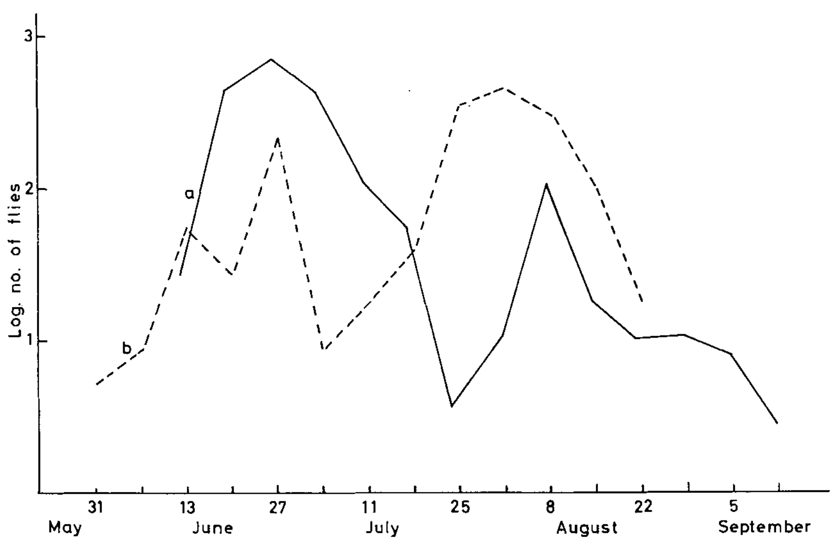

Fig. 5. Numbers of *Oscinella frit* L. caught in blue coloured water traps exposed on a permanent short grass field. Curve a: 1962, b: 1963.

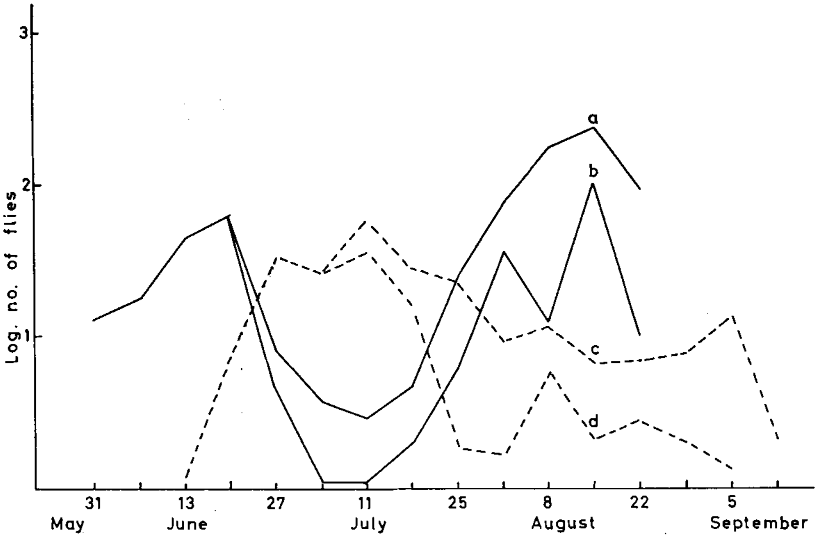

Fig. 6. Numbers of *Oscinella frit* L. caught in blue coloured water traps.
Explanation of the curves:
a: 1962, on plots with young oat plants (stages 1–3).
b: 1962, on plots sown 30.V.
c: 1963, on plots with young oat plants (stages 1–3).
d: 1963, on plots sown 28.V.

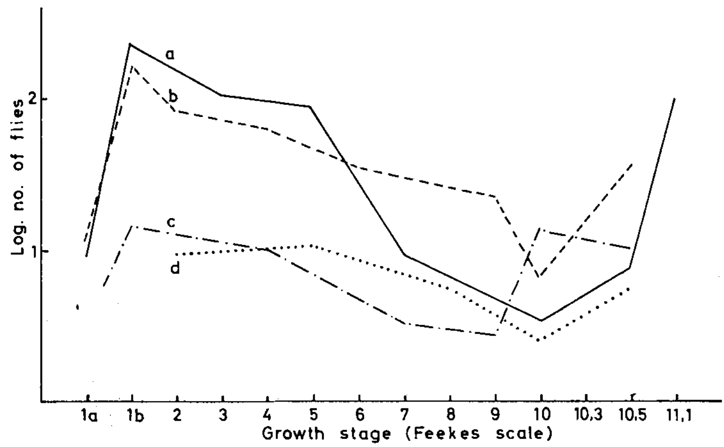

Fig. 7. Numbers of *Oscinella frit* L. caught in blue coloured water traps on oats plots sown at different times.
a: catches 2–8.VII, 1962, b: catches 9–15.VIII, 1962;
c: catches 30.VII–6.VIII, 1963; d: catches 7–13.VIII, 1963.

The influence of the weather on sweep-net catches from short grass was calculated. The correlation values for temperature versus catches were − 0.13 and for wind speed versus catches − 0.29, both with DF = 56. The latter is significant on the 5% level.

Water traps were operated in 1962 and 1963 only. As with the sweep-net, most flies were caught on the short-grass biotope (Fig. 5), but with the water trap catches the two seasonal peaks were more pronounced. In spring-sown oats many flies were trapped in early summer while the oats plants were in the tillering stage; then the numbers gradually decreased (Fig. 6). A second peak in August was apparent in 1962, but almost undetectable the following year.

The growth stage of the plants greatly influenced the trap catches. Fig. 7 shows that the frit flies were most attracted to oats plants in the tillering and in the heading stage.

Table II gives the number of frit flies caught in traps of different colours. More frit flies were caught in the blue traps than in the yellow, green, and red ones. The preference for blue was especially high on the short-grass biotope.

A total of 9,554 frit flies were caught in the blue traps, 47.7% of which were females, the sex ratio being nearly the same in catches from short-grass and from oats. Among the flies trapped during the first week of the

TABLE II. Number of *Oscinella frit* L. caught in water traps of different colours

Biotope	Trapping period		Number of flies caught per trap Blue	Yellow	Green	Red	LSD
Barley	20.VI–23.VIII	1961	639	546	88	16	104
Short-grass	24.V–22.VIII	1963	934	103			173
» »	7.VI–18.VI	1962	310	83	81		41

TABLE III. Correlation coefficient (r) between numbers of *Oscinella frit* L. caught in blue coloured water traps and average maximum temperature on the days of exposure, and rainfull during time of exposure

	DF	Average max. temp.	Rainfall
1962	33	+ 0.65+++	− 0.26
1963	28	+ 0.11	− 0.37+

\+ = significant on the 5% level
+++ = « « « 1% «

years 1962 and 1963 only 33 and 26 per cent respectively were females.

The influence of temperature and rainfall on the blue trap catches from the short grass biotope is shown in Table III. As criterion for temperature, the average of maximum temperatures on the days of exposure is used. The catches were positively correlated with temperature in 1962, and negatively correlated with rainfall in 1963, the coefficients for temperature in 1963 and rainfall in 1962 being insignificant.

On clear days in June, five blue water traps were exposed from early morning till late night and emptied every second hour during the day (Table IV). On one day only were frit flies caught before 0800 hours. Most flies were trapped about mid-day and none after 2000 hours.

TABLE IV. Two-hourly catches of *Oscinella frit* L. in sets of three blue coloured water traps

Date and biotope	Hours (G.M.T.) 06–08	08–10	10–12	12–14	14–16	16–18	18–20	20–22	Total	Max.-temp. (C°)
I.VI.61 Oats ...	0	3	12	25	16	9	2	0	67	24.4
7.VIII.61 « ...	8	27	36	43	29	17	3	0	163	25.0
7.VI.62 Short grass	0	1	21	33	46	12	0	0	113	24.7
8.VI.62 « «	0	6	29	21	32	14	3	0	105	21.5
12.VI.62 « «	0	0	7	14	10	4	0	0	35	16.0
Total	8	37	105	136	133	56	8	0	483	

DISCUSSION

Since the report of Schøyen (1898) it has been assumed that *O. frit* in Norway develops three generations a year. The present investigation shows that under normal climatic conditions in Ås there will be two complete generations and a more or less partial third one. Assuming a threshold temperature of 12°C for both pupation and larval feeding (Kreiter 1930), the months May-September mainly provide sufficiently high temperatures for this at Ås. With normal temperatures, the sum of day degrees for May—September is 2,043 (Table I), which is less than 3 times the average of 723°C needed per generation under these climatic conditions. Temperature varies with the years, however, and as the day degrees requirement decreases when temperature increases, there are great differences between years regarding the completion of the third generation. Within this limited range of temperatures the relationship between temperature and day degrees approximates a straight line, though with more extreme temperatures it is likely to fit a logistic curve (Andrewartha 1961). This may also explain why the day degree requirement at Ås was higher than in England (Jepson & Southwood 1958).

Of the years investigated, 1961 and 1963 were equal in sum of day degrees for the months May—September, but in 1961 the temperatures were above normal in late April, resulting in an early appearance of adults in the spring, which in turn led to an almost complete third generation in the autumn.

The emergence periods of imagines belonging to the overwintering- and spring generations did not overlap. Assuming a life time of fourteen days in the field (Jepson & Southwood 1958) the adult population ought to be very low before the emergence of the spring generation. The sweep-net and water trap catches also indicate a decrease in the population at that time, but not to the extent expected regarding the observations on emergence periods. However, the latter are based only on flies emerged from cultivated plants, and frit flies also appear from uncultivated grasses, where their development is likely to be more uneven. Because of the migratory behaviour of the species (Johnson, Taylor & Southwood 1962) frit flies from different biotopes contribute to the population within an area.

Difficulties often arise in interpreting the results of sweepnet catches (Strickland 1961). In the present investigation effects of temperature, wind speed, and rainfall were considerably reduced by the occasional altering of the day or hour of sampling, as this was considered to be an error of less importance than extreme weather conditions. With the present sweeping technique both resting and low flying insects would be caught.

Concerning the water traps, the choice of colour is of great importance (Musolff 1959, Mayer 1961) though the attractiveness of a colour may vary with the surroundings (Görnitz 1956). In Germany (Mayer 1961) the proportions of frit flies trapped in blue and in yellow water traps were much the same in several crops. The present material, however, shows that the frit flies were more attracted to blue compared with yellow in a field of short grass than in barley. A seasonal change in effect of colour was apparent in the barley field. Yellow traps constantly attracted more frit flies than blue traps until July, when the situation was reversed. On the short-grass biotope, blue was constantly the most attractive colour, with no significant alteration in the proportion blue: yellow during the summer.

The two methods of sampling, sweep-net and water traps, may be compared by the catches from the short-grass field. In 1962 and 1963 respectively, the sweep-net caught 3 and 6 times as many frit flies as the water traps. Sweeping was made once during each exposure period of the water traps, and the correlation coefficients between numbers of frit flies in the two groups were $r = +0.36$ with $DF = 23$ in 1962 and $r = +0.39$ with $DF = 32$ in 1963. The latter is significant on the 5% level. Thus the two methods do not always give the same picture of the population fluctuations.

One reason for this may be that sweep-net catches are less dependent on insect activity. Presumably the water trap catches therefore give the best description of the fluctuations in frit fly activity, while the sweep-net catches describe more accurately the fluctuations in population density.

The population of frit flies in any field is largely dependent on plant species and on the growth stage of the plants (Mayer 1961). In oats, frit flies were most abundant in plots with plants in the tillering stage (Figure 4), though these differences would undoubtedly have been more pronounced with larger oats plots.

With a dispersive insect like the frit fly, the relative attractiveness of plants in a limited field is greatly influenced by its surrounding vegetation, so that even a permanent short-grass biotope attracts varying proportions of the frit fly populations during the summer. However, seasonal fluctuations in frit fly populations due to change in attractiveness of the biotope itself were much less in the short-grass field than in growing crops.

SUMMARY

Investigations on emergence periods, life cycles and population fluctuations of *Oscinella frit* L. were carried out at Ås in the years 1962–63.

Oscinella frit overwinter as larvae, pupate in the spring, and the adults emerge in late May and June; most flies appear in the course of 10–20 days. Flies of the spring generation emerge in July—August, and adults of a third (summer) generation may appear in late August and September. With normal climatic conditions at Ås there will be two complete generations and a partial third one. In cool years, like 1962, there will be only two generations.

Population densities were estimated by means of sweeping and trapping, using coloured water traps. The two methods of sampling do not always give the same picture of the population fluctuations. The water trap catches are entirely dependent on insect activity, while both active and resting flies were caught in the sweep-net. Thus the water trap method better reflects the frit fly activity while the sweep-net catches better describe population density. With the water traps choice of colour is of great importance. Frit flies were far more attracted to blue and yellow colours than to green and red.

The sampling shows that adult frit flies occur throughout the summer, with peaks of abundance corresponding to emergence of the overwintering and spring generations. The number of flies in a particular field is also largely dependent on plant species, and on the growth stage of the plants. Population fluctuations were therefore much less in a field of permanent short grass than in growing crops.

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Biogeographical Reflections with Special Reference to the Beetle Fauna of Western Norway

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Certain preliminary results have been given in an earlier work (Fridén 1965). On the basis of these results I will now present some additional remarks.

From a faunistic point of view, the investigated Hardanger area (Fridén 1965) may be of interest, since its climate is one of the most oceanic in Scandinavia. The precipitation is remarkably high, even if it decreases considerably further inland (Godske 1952) The vast glacier Folgefonn is an evidence of the character of the climate. The oceanity index is high (Lindroth 1949, p. 490). The interior parts of western Norway (e.g. the Flåmsdal; Fridén 1965), on the other hand, are under the lee. Studies of previous faunistic and floristic investigations of western Norway (e.g. Hultén 1950, Lindrot 1945, Nordhagen 1963) show that an abundance of species is not to be expected in this area, and that several species, widely spread in the Scandinavian mountain chain, do not occur at all. This is confirmed by my previous investigations (Fridén 1965). Nevertheless negative results should be considered. According to Økland (1925) and Tjønneland (1952) the coast of western Norway should not be regarded as part of the High-Boreal zone of the Scandinavian Peninsula, as the fauna differs from the midland/inland fauna. There is, however, a distinguishing mark even about the real mountain fauna that seems to lack certain species which have a wide distribution in the Scandinavian mountains.

The duct plants, which have been well investigated, show interesting features of distribution in western Norway (Hultén 1950). The pronouncedly oceanic climate is indicated by *Blechnum spicant*, *Cryptogramma crispa*, *Digitalis purpurea*, *Galium hercynicum*, and *Narthecium ossifragum*. Some plants, namely *Alchemilla alpina*, *Oxyria digyna*, and *Saxifraga aizoides* reach the sea-level in several places, not only along brooks, but also in other localities. It is noteworthy that a number of lowland species which elsewhere in Scandinavia have a wide distribution are lacking. Evidently they have not been able to cross the mountain chain or have not hibernated on the coast, for instance *Calamagrostis arundinacea*, *C. canescens*, *Carex loliacea*, *Salix cinerea*, *Ranunculus peltatus*, *Acer platanoides*, *Pyrola rotundifolia*, and *Campanula persicifolia* (Hultén 1950). Certain plants which have a wide distribution in and near the Scandinavian mountain chain and are found in the interior of southern Norway are, in spite of the presence of high mountains, lacking in the coastal parts, for instance *Agrostis borealis*, *Aconitum septentrionale*, *Viola biflora* and *Pedicularis lapponica* (Hultén 1950). Various species of *Salix* which occur mainly in the mountain chain are not found in the coastal districts of western Norway (Hultén 1950). The exterior parts of western Norway form the only region in Scandinavia where *Asplenium adiantum-nigrum*, *Carex binervis*, *Chrysosplenium oppositifolium*, *Dryopteris borreri*, *Erica cinerea*, *Hymenophyllum peltatum*, *Ilex aquifolium*, *Primula vulgaris* and *Vicia orobus* (oceanic, Fægri 1958, 1960) are found. Thus the presence of the oceanic plants in western Norway is compensated for by the absence of several both lowland and mountain species that have a wide distribution in Scandinavia.

As to the beetle fauna, which I will particularly try to analyse, the distribution is more difficult to survey as it has been much less thoroughly investigated. Nevertheless similar cases of distribution seem to exist. It is a fact that uni- and bicentric species, with a restricted distribution in the high mountains of central south Norway, are not found in the coastal districts. The question is whether the hypothesis of nunatak survival in the interior can be used as botanists use it (e.g. Gjærevoll 1963). I have looked in vain for a large number of species which I had expected to find in the two investigated areas (Fridén 1965). Certain mountain species which are common in northern Scandinavia, e.g. *Bembidion hasti* Sahlb., mostly seem to occur only in very high central areas in the southern parts (Lindroth 1945). Thus they have a very disjunct distribution in western Norway (Fridén 1965). *Bembidion difficile* Mtsch. has been found neither there nor in the southernmost mountain districts (Lindroth 1945), but may of course have wide gaps in its distribution. About the same may be said of *Bembidion grapei* Gyll., *Trichocellus cognatus* Gyll., and *Pterostichus adstrictus* Eschz. All three have been found in Ri and VAi (Strand 1943), the last two being common in northern Scandinavia. Neither *Amara alpina* Payk., *Cylletron nivale* Th. nor *Olophrum boreale* Payk. has been found in certain mountain districts of western Norway, nor has *Helophorus glacialis* Villa, *Arpedium brunnescens* J. Sahlb., *Boreaphilus henningianus* Sahlb., *Mycetopotus monticola* Fowl., *Atheta frigida* J. Sahlb. or *Hypnoidus rivularis* Gyll. (Lindroth 1945, 1960).

Judging from lists of distribution, certain non-mountain beetles which are widely distributed in Scandinavia, e.g. *Asaphicion pallipes* Dft. have not been found in western Norway. Furthermore a number of not real mountain species e.g. *Bembidion doris* Panz. (Lindroth 1945, 1960), with analogies among the duct plants (see above), have reached high levels of the valleys of eastern Norway and spread along the southern coast of western Norway, but seem to have gained a footing only in certain parts of it. They have a wide distribution in the rest of Scandinavia. High passes in the interior and steep shores on the coast lacking suitable grounds for their expansion may have hindered them. Several species, e.g. *Agonum piceum* L., *A. viduum* Panz., *Bembidion quadrimaculatum* L., and *Blethisa multipunctata* L. (Lindroth 1945, 1960) which, however, are found far to the north of Scandinavia and have spread via the district of Jämtland to the Trondheim area, do not occur at least in the greater part of western Norway. As a matter of fact, in many cases it is difficult to decide whether the gaps of the known distribution are due to insufficient exploration or to genuine absence.

It is difficult to find an analogy between the beetles and the pronouncedly oceanic coastal plants of distal western Norway (see above; Sjörs 1963). *Bembidion tibitale* Dft. has a restricted distribution in south-western Norway which, however, may have a particular explanation (Lindroth 1949, p. 765).

In the south of Sweden some species which are distributed over the whole of Scandinavia, for instance *Patrobus assimilis* Chd., show small abundance (Lindroth 1945). It seems to me that the case is similar in the coastal districts of western Norway. On the other hand, in several places in the Sub-Alpine zone (Lindroth 1945) too, I have found, in great abundance, *Patrobus atrorufus* Strøm (brachypterous) and *Trichocellus placidus* Gyll. (730 m above sea-level), the latter of which is not found in the main part of northern Scandinavia. *Patrobus atrorufus* was also found in the Alpine zone. Thus it is probable that certain species reach higher levels in coastal districts, where climatically favoured areas are not far away, than inland.

It might be imagined that species which, in the rest of Scandinavia, occur only on shady (e.g. in woods) or rather moist ground, in western Norway are also found in open localities, where light conditions are adequate or low humidity is compensated for by higher air moisture (Fridén 1965).

My investigations of *Sphagnum* soils have shown surprisingly that *Pterostichus diligens* Sturm, which, in the whole of Scandinavia, is the most characteristic species on such ground, has a strong competitor there, viz. *Trichocellus placidus* (Fridén 1963).

The extreme climatic conditions of western Norway, however, are not accompanied by any noteworthy racial differentiations (as to duct plants see Hultén 1949; a certain correspondence will evidently occur among beetles, Lindroth 1941), as, e.g., in Central Europe and Alaska.

SUMMARY

An analysis of the beetle fauna of western Norway, initiated in an earlier work (Fridén 1965), is continued. Some reflections upon the duct plants are a starting-point. Though certain parts of the above-mentioned area are insufficiently investigated, it is obvious that several real mountain species as well as lowland ones, which have a wide distribution in Scandinavia, are lacking in western Norway or have a disjunct distribution there. Correspondence with the duct plants exists. The reason for these discrepancies will be historical, not climatic. With regard to ecology, some differences, obtained in comparison with the remaining part of Scandinavia, are pointed out.

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Notes on *Limnophilus germanus* McLachlan (Trichoptera, Limnophilidae)

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In a sample of trichopters collected by the author on October 20 and 23 1966, 3 ♂♂ and 35 ♀♀ were identified as *Limnophilus germanus* McLachlan. The specimens were collected by hand-net at the lake Jonsvatnet and at a very slow-running rivulet in Trondheim. This species has not previously been recorded in Norway.

Both habitats belong to the same river system, and they have a rich vegetation. The surroundings at Jonsvatnet are cultivated fields, and the most dominating plants are *Phragmites communis*, *Equisetum* sp., *Myriophyllum* sp., various moss species, and green algae. The rivulet runs very slowly through a moor overgrown with *Carex lasiocarpa* and *Carex rostrata*. *Myriophyllum* sp., moss, *Characeae*, and other green algae are the most conspicuous submerged vegetation. Water conditions for the habitat at Jonsvatnet are given in Table I.

TABLE I. Min. and max. values of measurements carried out 1960–61 at Jonsvatnet by Hans Holtan, Norwegian Institute for Water Research

pH	Spec. conductivity	Total hardness mg CaO/l	Cl^- mg/l	Alkalinity ml.n/10 HCl/l
6.6–7.3	50.6–55.3	9.7–12.3	4.62–5.76	2.8–3.7

Tjeder (1928, 1938) gives a description of some localities in Sweden where *L. germanus* has been recorded. In his study it also was found in lakes and brooks with a rich vegetation.

The specimens collected in Trondheim differ from the descriptions given by previous authors (McLachlan 1874–80, Ulmer 1909, Esben-Petersen

1916), and I will therefore give some additional notes. The examinations are based upon specimens preserved in 70% alcohol.

The antennae are brownish-yellow with slight apical crenations. The anterior wings are yellowish-brown to brown, frequently with dark brown spots. On the apical margin of each wing there is a pale lunate space margined basally by a broad brown line. The pale lunate space varies greatly in size. Both length and colour of the line are variable, almost invisible in some of the yellowish-brown specimens and never extending along the posterior margin of the wings. In the brown specimens it is distinct and almost always continues posteriorly along the margin of the wings. The venation may be partly black in colour. Its disc-cell is longer than its footstalk.

The posterior wings are almost hyaline, and the ♂♂ have no beard on the 1st apical sector. McLachlan's (1874–80), description of *L. germanus* states: 'The "beard" on the 1st apical sector in the posterior wings of the ♂ is conspicuous and occupies a long space'. It is interesting to note that ♂♂ recorded by Tjeder (1928) in Falun, Sweden, also lack this beard. As far as I have been able to determine, this variation has previously been reported only by Tjeder (1928). Wing expansion is known to vary between 26 and 31 mm (McLachlan 1874–80, Ulmer 1909, Esben-Petersen 1916).

TABLE II. Expanse of the wings measured to the nearest mm of *L. germanus* collected in Trondheim

Expanse of the wings in mm.	21	22	23	24	25	26	27	28	29	30
♂♂	1		1			1				
♀♀				2	5	11	3	8	3	3

The wing measurements recorded in the present study are given in Table II, which shows that the expanse of the wings is more variable in this species than hitherto known. For the ♂♂ minimum wing expansion in this study was 21 mm and the maximum was 26 mm. The ♀♀ are usually slightly larger, with the minimum of 24 mm and a maximum expanse of 30 mm. These measurements show that the expanse of the wings may vary between 21 and 31 mm in the population as a whole.

The genitalia of the ♂ and ♀ are drawn in Fig. 1 and they are in accordance with the description given by McLachlan (1874–80), except for the 8th dorsal segment of the ♀ (Fig. 1E). The segment is not curved inward and has no deep cleft. It has the same appearance as the other dorsal seg-

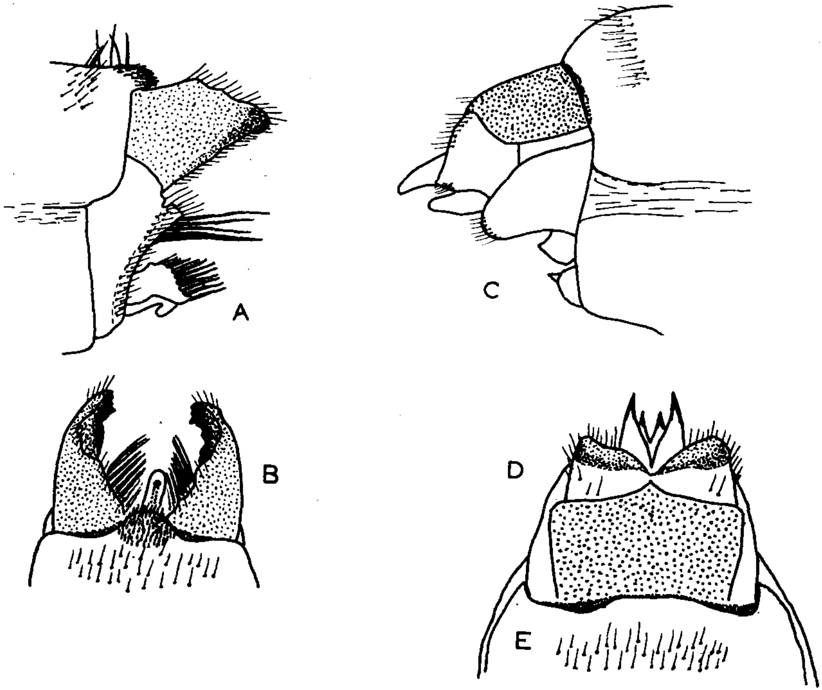

Fig. 1. Genitalia of ♂ and ♀ of *Limnophilus germanus* McLachl. A lateral view♂. B dorsal view ♂. C lateral view ♀. D dorsal view ♀. E 8th dorsal segment ♀.

ments, and although this cleft is not mentioned in McLachlan's description of the ♀, it is very conspicuous in his drawings.

Of the 35 ♀♀ only one had the abdomen filled with eggs. The eggs were counted, and the number was 495–500. It is to be expected that the specimens were caught at the end of the mating flight period, since only one ♀ was carrying eggs. Nybom (1960) found the mating flight period in Finland to be Sept.–Oct., and further south in Europe it is stated to be Aug.–Oct. (Ulmer 1909, Espen-Petersen 1916).

Limnophilus germanus is recorded only from Europe (Schmid 1955) and according to Espen-Petersen (1916) it is a rare and local species on the European continent. In Finland Nybom (1960) found it to be common, but also local (Fig. 2). The data from the present study are plotted in Fig. 2, together with the distribution in Finland and Sweden.

Both Trondheim and the areas in Finland and Sweden from which *L. germanus* is reported are all within the southern-boreal subzone according to Sjörs (1963). Therefore, if *L. germanus* is indeed a southern-boreal species,

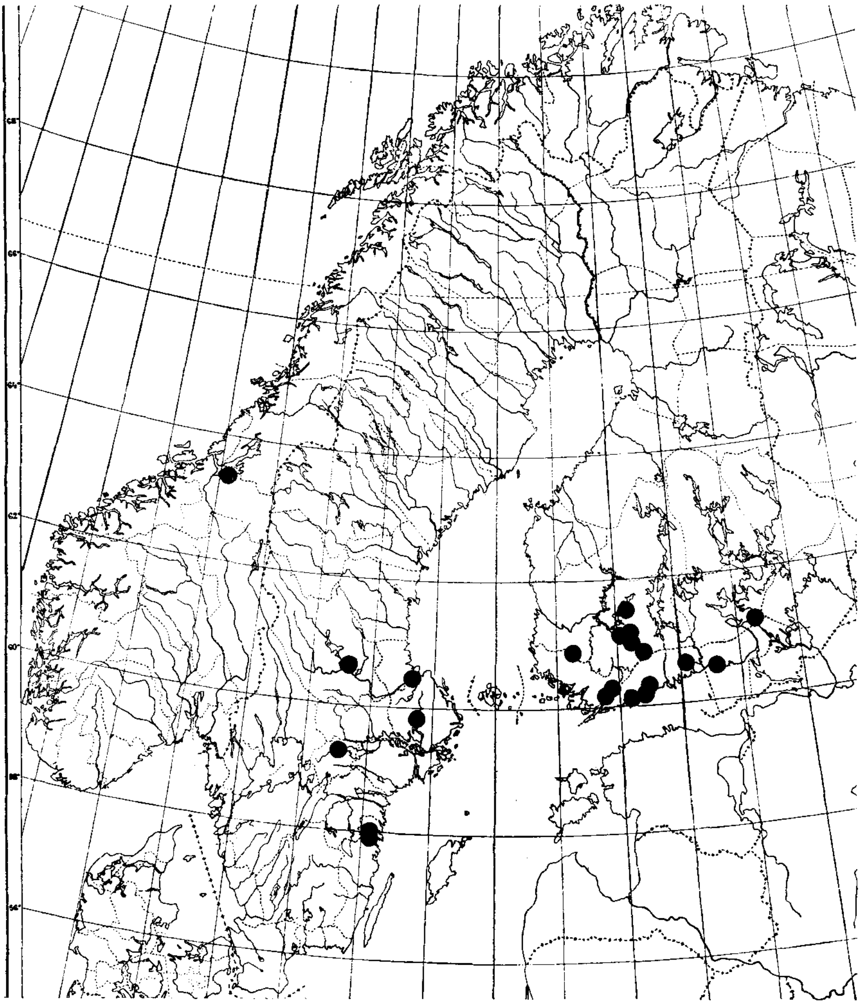

Fig. 2. The record of *Limnophilus germanus* McLachl. in Norway and the distribution in Finland and Sweden.

it should also occur in the Oslo area and possibly along the West Coast to Sør-Trøndelag.

This collection of *L. germanus* has been compared with specimens borrowed from the Entomological Museum, Lund, Sweden.

SUMMARY

Limnophilus germanus is reported for the first time in Norway from Trondheim, S-Trøndelag. Ecological data for the habitat where the species was collected are given. Morphological variations in this species are discussed, and drawings of ♂ and ♀ genitalia are presented. The distribution in Finland and Sweden is shown on a map.

ACKNOWLEDGEMENTS

I should like to thank Professor Dr K.-H. Forsslund, Stockholm, for valuable help on the distribution in Sweden, and also Dr Bo Tjeder, Entomological Museum, Lund, and Mr Hans Holtan, Norwegian Institute for Water Research. Mr R. Brekke, Trondheim, has kindly checked the identification.

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Über die europäischen Arten der *Scaphosoma agaricinum* -Gruppe (Col., Scaphidiidae)

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(Eingegangen 4. Februar 1967)

Die in Europa vorkommenden *Scaphosoma*-Arten mit stark verkürtzten Nahtstreifen, die nicht parallel mit dem Basalrand der Flügeldecken verlaufen, gehören alle zu nächsten Verwandtschaft der Art *S. agaricinum* (L.) und bilden zusammen mit der Art *S. laeviusculum* Reitt. eine gut abgegrenzte Gruppe von Arten. Ausser den kurzen Nahtstreifen ist für diese Gruppe die Ausbildung der Fühler mit dem kurzen achten Glied, das nicht mikroskulptierte Metasternum und die Form des einfachen Aedoeagus mit geraden Innensack characteristisch. In den europäischen Ländern wurden bisher vier Arten dieser Gruppe bekannt: *S. agaricinum* (L.), *S. corcyricum* Löbl, *S. italicum* Tam., *S. erratum* Löbl. Von diesen Arten ist nur *agaricinum* weit über Europa verbreitet und im allgemeinen sehr häufig zu finden. Die übrigen drei Arten sind nur aus dem mediterranen Gebiet bekannt (*corcyricum* aus Corfu und Dalmatien, *italicum* aus Italien und Albanien, *erratum* aus Sicilien und Nordafrika).

Vor kurzem bekam ich von Herrn Dr. A. Strand, Oslo ein ♂, das in Kaamanen in Finnland gefunden wurde, und das ich schon bei einer früheren Untersuchung dieses Exemplares, ohne den Aedoeagus zu untersuchen, als *agaricinum* bestimmt hatte. Dr. Strand preparierte den Aedoeagus dieses Exemplares und stellte fest, dass es zu einer von *agaricinum* distincte Art gehört; nun konnte ich feststellen, dass es sich um die Art *S. inopinatum* Löbl handelt, die vor kurzem nach aus Sibirien stammenden Exemplaren "*S. agaricinum*" beschrieben wurde (Löbl 1967). Unter einigen bisher nicht bestimmten Scaphosomen meiner Spezialsammlung habe ich noch weitere vier Belege dieser Art gefunden: 3 Ex. aus Nordwestrussland, "Jurjew" und 1 Ex. aus Jugoslawien, Zavidovic. Diese Belege zeigen, dass *S. inopi-*

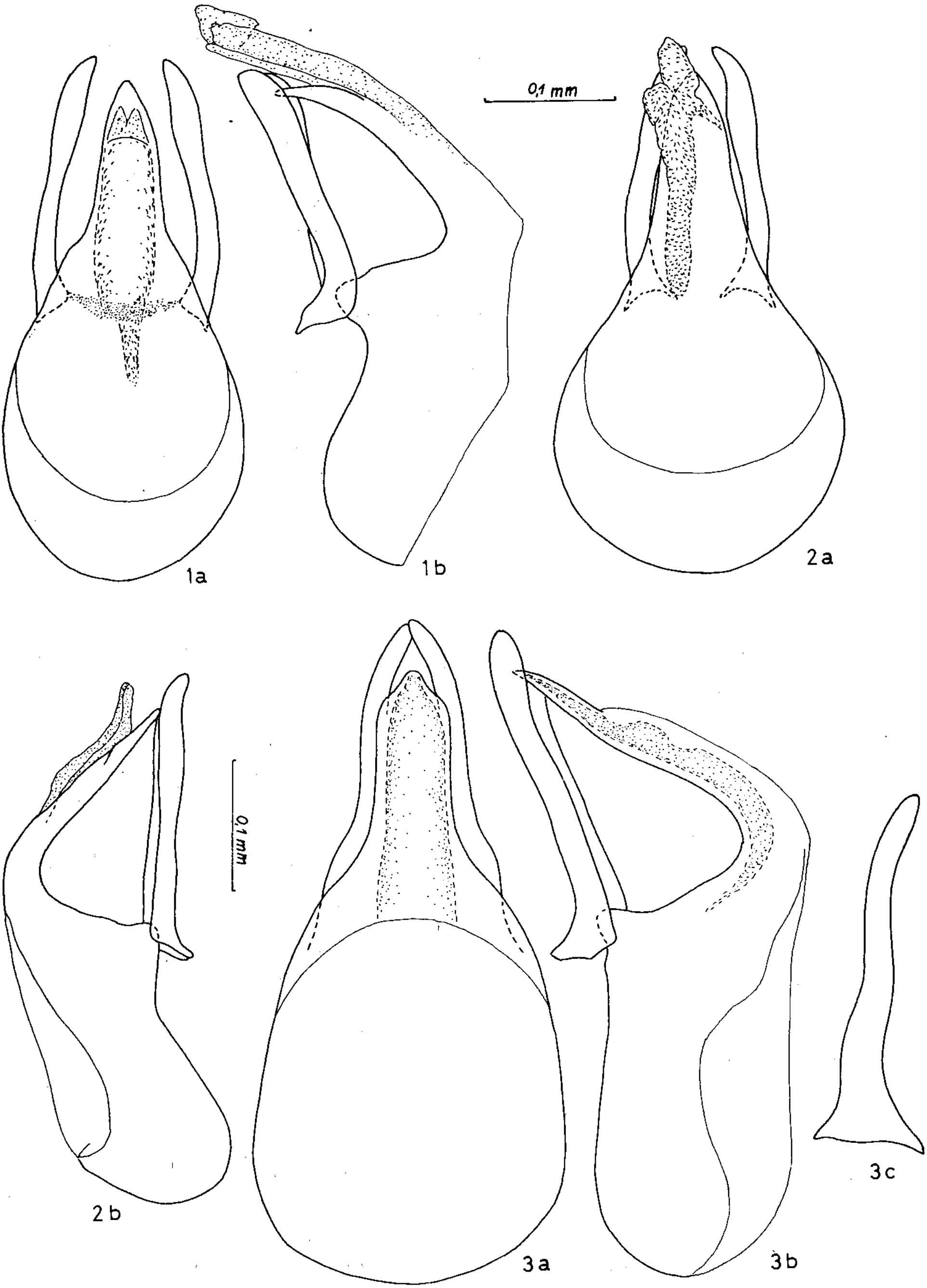

Abb. 1: *Scaphosoma agaricinum* (Linnaeus); a.: Aedoeagus bei Dorsalansicht; b.: Aedoeagus bei Lateralansicht. Abb. 2: *Scaphosoma erratum* Löbl; a.: Aedoeagus bei Dorsalansicht; b.: Aedoeagus bei Lateralansicht. Abb. 3: *Scaphosoma inopinatum* Löbl; a.: Aedoeagus bei Dorsalansicht; b.: Aedoeagus bei Lateralansicht; c.: Paramere bei Ventralansicht.

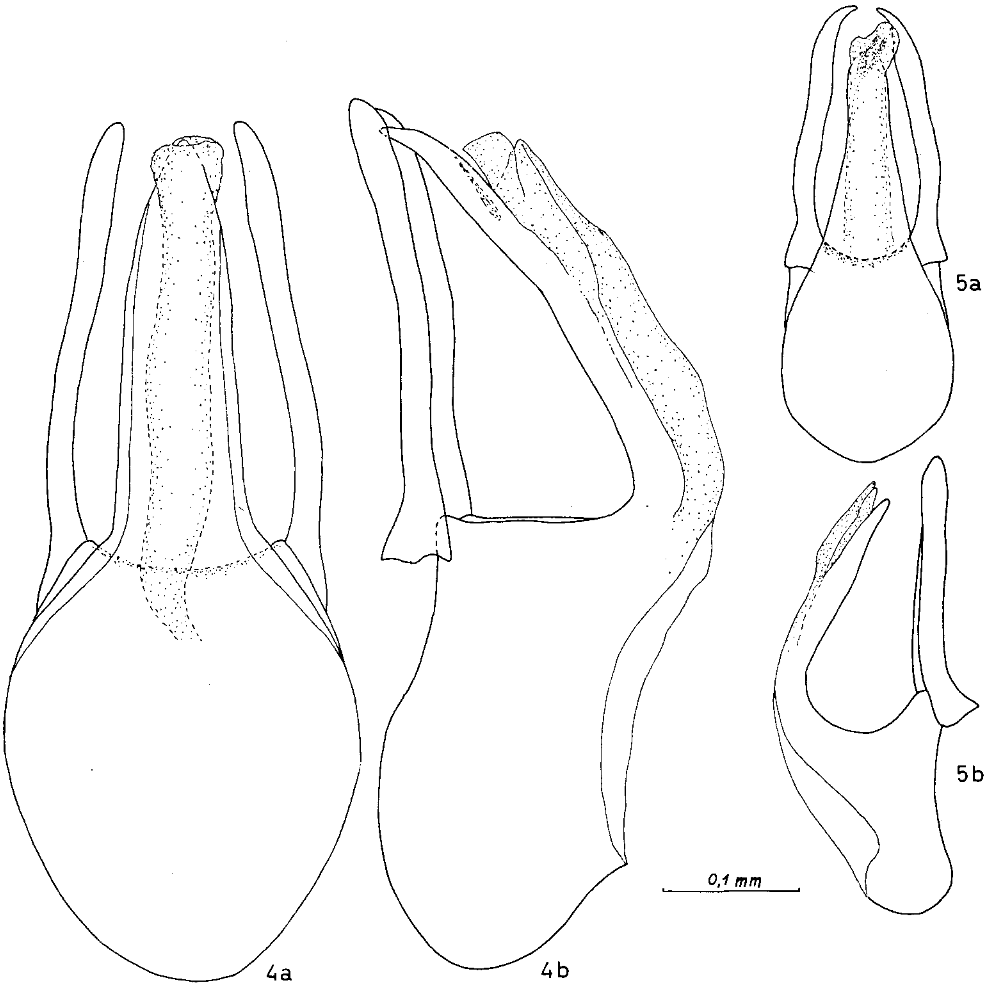

Abb. 4: *Scaphosoma corcyrium* Löbl; a.: Aedoeagus bei Dorsalansicht; b.: Aedoeagus bei Lateralansicht. Abb. 5: *Scaphosoma italicum* Tamanini; a.: Aedoeagus bei Dorsalansicht; b.: Aedoeagus bei Lateralansicht.

natum weit in Europa verbreitet und vielleicht, ähnlich wie *S. boreale* Ldbl., eine euro-sibirische Art ist.

Bisher wurden die nord- und mitteleuropäischen Scaphosomen mit kurzen Nahtstreifen stets als *S. agaricinum* bestimmt (sofern nicht von manchen älteren Autoren mit ganz anderen Arten verwechselt). Auch ich habe solche Scaphosomen fast immer nur nach den äusserlichen Merkmalen bestimmt — in der Annahme, es wäre unnötig, tausende Belege am Aedoeagus zu untersuchen, wenn man nur eine einzige Art erwarten kann. Jedoch die neuen Belege von *S. inopinatum* zeigen, dass es notwendig ist, alle bisherigen Angaben über *S. agaricinum* einer kritischen Nachprüfung zu unterziehen.

Nach den ektoskeletischen Merkmalen sind die einzelnen Arten der *agaricinum*-Gruppe schwer zu trennen. Nur *S. erratum* lässt sich nach der Ausbilding der Fühler mit sehr kurzem 4. Glied (höchstens anderthalbmal länger als das 3.) und *S. italicum* durch die geringe Grösse und feine Punktierung (etwa so fein wie bei *S. laeviusculum* sicher bestimmen.

ZUSAMMENFASSUNG

In dieser Mitteilung ist die Art *Scaphosoma inopinatum* Löbl aus Finnland, Nordwestrussland und Jugoslawien neu gemeldet. Diese Art wurde vor kurzem aus Sibirien beschrieben. Weiterhin ist die Verbreitung der übrigen europäischen Arten der Gruppe *S, agaricinum* L. kurz besprochen. Diese Arten sind miteinander nahe verwandt, unterscheiden sich am besten durch die abweichenden Aedoeagen, wie die Abbildungen zeigen.

LITERATUR

Löbl I., 1967: Neue und wenig bekannte paläarktische Arten der Gattung Scaphosoma Leach (Col., Scaphidiidae). *Acta ent.bohemosl.* 64., 105–111.

Faunistical Notes on Neuroptera from Southern Norway

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(Received 8 February 1967)

The distribution of the Neuroptera in Norway is still incompletely known. Since Tjeder (1945) published his *Catalogus Neuropterorum et Mecopterorum Norvegiae*, only short notes about some of the members of this order in Norway have been published.

During the last years I have examined a large material of Neuroptera collected partly by myself and partly by others. In this material I found species hitherto known from only one or two localities in Norway, or not at all. I also found that some species, which earlier have been known from scattered areas only, appeared to be quite common. Among material from Oslo University, Zoological Museum, I have examined the collection of the late F. Jensen, Stavanger, which has been partly published by Tjeder (1945).

Unless otherwise stated all specimens have been collected and determined by the author. In cases where the individual could not be determined to either sex, the word 'specimen' is used. The geographical divisions follow Strand (1943).

The main purpose of this paper is to add further knowledge to the distribution of some species of Neuroptera in Southern Norway.

FAM. HEMEROBIDAE

Hemerobius micans Oliv. 1792

List of records. Ry: Fister, Hidle (Hille) 23/5 1943; 2 ♂♂ 3 ♂♂ (F. Jensen, det. B. Tjeder). Dale, Hetland 1/8 1954; 1 specimen, 1/8 1956; 2 ♀♀, 24/5 1957; 1 specimen (A . and T. Nielsen). HOy: Bergen, Sandviken 28/5 1966; 1 specimen, 7/6 1966; 1 ♂, 8/6 1966; 1 ♂ 1 ♀, on bushes (A. Fjellberg). Fana, Hammerslandsfjell 28/5 1966; 1 specimen (A. Fjeldså). Alversund, Vollom 10/6 1966; 5 ♂♂ 7 ♀♀ 1 specimen, on *Fagus silvatica*. Bergen, Fjellveien, 16/6 1966; 1 ♀ 1 specimen, on bushes. Fana, Nesttun 16/6 1966; 1 ♂ (T. Nielsen). Åsane, Åstveit 18/6 1966; 1 ♀ (T. Nielsen). Meland, Brakstad 8/7 1966 2 ♀♀, on *Corylus avellana*.

Hemerobius micans has previously only been recorded from one locality in Norway, viz. Djønno in Hardanger (Tjeder 1944, 1945). The record from VAy: Kvinesdal, Gjemlestad (Jensen 1950) is not correct. The specimen proved to be *H. marginatus*.

From the numerous new records one must conclude that *H. micans* is probably common in South-West Norway. The species prefers warmth-loving trees and bushes like *Fagus silvatica*, and sometimes occurs in large numbers on this tree (Aspöck & Aspöck 1964). At Vollom, Alversund, where the northernmost beech forest in Europe is situated, I found this species in great numbers. The animals were not found in the dense forest, but associated with single beech trees at the edge of the main forest.

Meinander (1962) describes *H. micans* as a distinctly southern species in Finland; in Sweden it is found north to Uppland (Tjeder 1940). Outside Scandinavia *H. micans* is found all over Europe (Aspöck & Aspöck 1964).

Hemerobius nitidulus Fabricius 1777

List of records. On: Dovre, Dørålseter 3/8 1965; 1 ♀ 1 specimen (L. Greve & H. B. Jensen). VE: Tjøme, Kjære 28/5 1965; 1 ♂ on *Pinus silvestris* (A. Fjellberg). Ry: Klepp, Reve 8/7 1956; 1 ♀ (A. Nielsen). Hetland, Dale 23/8 1965; 1 ♀, 5/9 1965; 1 ♀ (T. Nielsen). HOi: Kvinherad, Ljosmyr 3/9 1965; 1 ♀ on *P. silvestris*. Voss, Mjølfjell, near Sollien 18/6 1966; 1 ♂, 680 m above sea level, on *P. silvestris*. HOy: Fana, Store Milde 10/7 1966; 1 ♀. Bruvik, Eidslandet, 4/7 1966; 1 ♀. STy: Bjugn, Dragvannet 13/8 1962; 1 ♀ (R. Dahlby). Bjugn, Reitbakken 16/7 1964; 1 ♀ (R. Dahlby). Agdenes, Vettaliheia 30/7 1964; 1 ♀ (R. Dahlby). STi: Strinda, Haukvannet, Byåsen 6/8 19??; 2 ♀♀ (det. B. Tjeder). Røros Landsogn, near Feragen 17/7 1966; 2 ♀♀ on *P. silvestris*. NTi: Frosta, Holmberget 9/8 1966; 1 ♀ (A. Pettersen.)

H. nitidulus is not previously recorded from VE, Ry, HOi, STi, STy and NTi. Tjeder (1944) concludes that the species is certainly common and he (1945) mentions it from widely scattered areas in the country. Having regard to all the new records, Tjeder's conclusion is confirmed.

H. nitidulus is confined to conifers and found on both *Pinus silvestris* and *Picea abies*, with a preference for the former. The locality at Mjølfjell is situated on the border line for pine in Western Norway and thus shows that *H. nitidulus* accompanies the pine to its maximum altitude. At Dørålseter two specimens were found on the glacier 1943 m above sea level, having probably blown there with the wind from the pine forest down in the valley.

H. nitidulus is common on conifers in Scandinavia (Meinander 1962) and also in all parts of Europe (Zeleny 1963).

Hemerobius perelegans Steph. 1838

List of records. HOi: Kvinherad, Løfallstrand 6/6 1966; 1 ♂ on *Alnus* sp. HOy: Bergen, Sandviken 8/6 1966; 1 ♂ on deciduous trees (A. Fjellberg). Alversund, Vollom 10/6 1966; 1 ♂ on *Fagus silvatica*, Fana, Store Milde 11/6 1966; 1 ♂ 12/6 1966; 1 ♀. STy: Åfjord, Staven 30/6 1950; 1 ♀ (M. Opheim, det. B. Tjeder).

H. perelegans is not previously recorded from HOy, HOi, and STy. In Norway south of Trøndelag it has hitherto only been reported from TEy (Tjeder 1945). It is found on various trees.

Meinander (1962) says it is uncommon in Finland, and Aspöck & Aspöck (1964) also say it is rare and report it from scattered places in Europe.

Hemerobius simulans Walk. 1853

List of records. VE: Tjøme, Kjære 1/5 1965; 1 ♀, 24/5 1965; 1 ♂ (A. Fjellberg). Ry: Hetland, Dale 17/8 1965; 2 ♂♂ (T. Nielsen). HOi: Kvinherad, Ljosmyr 3/9 1966; 1 ♀ (H. Kauri). HOy: Bergen, Botanisk Hage 21/4 1966; 1 ♂ (T. Nielsen), 29/4 1966; 1 ♂ (R. Larsen). Fana, Store Milde 3/9 1966; 1 ♂ 3 ♀♀, on *Corylus avellana.* Fana, Myravann, 12/5 1966; 1 specimen (A. Fjeldså). Bruvik, Eidslandet 6/4 1966; 7 ♂♂, 7/4 1966; 1 ♂ (L. Greve and H. B. Jensen). STi: Strinda, Fuglåsen, 11/9 1950; 1 ♀ (I. Esaissen, det. B. Tjeder).

Hemetobius simulans has earlier been recorded from widely scattered localities all over the country from AK to Fö (Tjeder, 1945). It is new to VE, Ry, HOi, and HOy. The records from Eidslandet were particularly interesting because of the early date and the climatic conditions. The ground was covered with snow and during the night the temperature fell below zero. Some of the specimens were caught when flying from tree to tree, or crawling on the snow. All were caught during the daytime. The forest consisted of *Pinus silvestris* and *Picea abies.*

Meinander (1962) reports *H. simulans* as uncommon, but at least it seems to be met with quite frequently in Western Norway. The species belongs to the holarctic element in the Norwegian insect fauna (Tjeder 1960, Nakahara 1965).

H. simulans is confined to conifers. In one locality, Store Milde, specimens were found on *Corylus,* but there were pine trees nearby.

Hemerobius stigma Steph. 1836

List of records. Os: Sør-Aurdal, Goplerud 9/11 1965; 2 ♂♂, 1 ♀ on *Picea abies* (A. Fjellberg). On: Dovre, on Veslesmeden 4/8 1965; 1 ♀ (L. Greve and H. B. Jensen). Bv: Hol, Geilo 8/10 1965; 1 ♀, 9/10 1965; 4 ♀♀, 10/10 1965; 2 ♂♂. VE: Tjøme, Eidene 25/4 1965; 1 ♂ (A. Fjellberg, det. A. Fjellberg). Tjøme, Solvang 1/5 1965; 1 ♂ on *Picea abies* (A. Fjellberg). Tjøme 14/5 1965; 1 ♀ 1 specimen, 28/5 1965; 1 ♀ on *Pinus silvestris* (A. Fjellberg). Ry: Høyland, Myrland 16/7 1965; 1 ♀ on *Pinus silvestris* (T. Nielsen). Klepp, Orre, 1/7 1956; 1 ♀ (A. and T. Nielsen). Hetland, Dale 25/4 1957; 1 ♂ (A. and T. Nielsen). HOi: Kvinherad, Ljosmyr 3/9 1965; 3 ♀♀, 2/6 1966; 10 ♀♀ on *P. silvestris* (L. Greve), 3/9 1966 4 ♀♀ (H. Kauri). Kvinherad, near Uskedal 2/6 1966; 1 ♀. HOy: Tysnes, Ånuglo 10/6 1965; 2 ♀♀, Bergen, Botanisk Hage 21/4 1966; 1 ♂, 1/5 1966; 1 ♀ (T. Nielsen). Bergen, Isdalen 5/5 1966; 6 ♂♂ 2 ♀♀, 8/5 1966; 1 ♂ (A. Fjellberg), Fana, Store Milde 8/5 1966; 3 ♂♂ 7 ♀♀, 29/5 1966; 1 ♀, 11/6 1966; 6 ♀♀, 12/6 1966; 2 ♀♀, 10/7 1966; 1 ♀, 31/7 1966; 1 ♂ on *P. silvestris.* Fana, Stend 19/5 1966; 1 ♂ 3 ♀♀ on *P. silvestris.* Fana, Skipanes 30/5 1966; 1 ♂ 1 ♀ on *P. silvestris.* Fana, Gåssand 15/5 1966; 1 ♂ 1 ♀ on *P. silvestris.* Fana, Biologisk stasjon 9–10/5 1966; 1 ♂ 4 ♀♀ on *P. silvestris.* Laksevåg, Håkonshella 28/5 1966; 1 ♂ 1 ♀ on *P. silvestris.* Bruvik, Eidslandet 3/7 1966; 1 ♀, 4/7 1966; 2 ♀♀ on *P. silvestris.* STi: Trondheim, Leangen 24/4 1966; 1 ♂ (H. Tveit).

Hemerobius stigma is not previously recorded from Os, VE, Hoi and STi. The numerous new records show, as already stated by Tjeder (1944), that *H. stigma* is a very common species in Norway. It is earlier known from localities scattered over the whole country. Meinander (1962) describes it as 'rather common' and it has a wide distribution which includes the whole of Europe, Japan, Madeira, and the Azores. Tjeder (1960) regards *H. stigmaterus* Fitch from N. America as a synonym of *H. stigma*, while Nakahara (1965) is inclined to accept them as distinct species.

H. stigma is found on coniferous trees and I have found it in Western Norway mostly on *Pinus silvestris*, which it prefers, but also on *Picea abies*.

The biology of *H. stigma* is different from other Norwegian *Hemerobius* species, as the animal hibernates as an imago (Fraser 1959). Meinander (1962) reports imagines from April to August in Finland, and Withycombe (1922) who describes the life history, based on material from England, says it can be found on the wing all year round.

I have myself found flying specimens in October at Geilo, situated approximately 800 m above sea level. The temperature was 20°C in the sun, 6–7°C in the shade, and at night probably fell somewhat below freezing point.

Mr. A. Fjellberg has on several occasions during the winter 1966 found specimens hidden under bark of felled *Picea abies* between 5.5 m and 7 m up the stem. His localities were near Goplerud, Sør-Aurdal.

Wesmalius subnebulosus Steph. 1836

List of records. Ry: Hetland, Gausel 24/5 1956; 1 ♀ (A. and T. Nielsen) HOy: Fana, Myravann primo sept.; 1 ♂ (A. Fjeldså). Fana, Hammarslandsfjell 28/5 1966; 1 ♀ (A. Fjeldså). STi: Strinda, Valene 30/8 1951; 1 ♀ (R. Dahlby, det. B. Tjeder).

Wesmalius subnebulosus is not previously recorded from STi. The locality is interesting because it represents the most northern record for the species in Scandinavia, where it has a distinctly southern distribution. In Finland it is only found along the south coast (Meinander 1962), in Sweden north to Dalsland (Tjeder 1940, 1953).

Outside Scandinavia *W. subnebulosus* is known from Europe, Northern Asia, and North America (Tjeder, 1960).

Sympherobius fuscescens Wall. 1863

List of records. VE: Tjøme, 13/7 1966; 1 ♂, 16/7 1966; 1 ♂, 2 ♀♀, on *P. silvestris* (A. Fjellberg, det. A. Fjellberg). AAy: Høvåg, Høvåg 18/7 1966; 1 ♀ on *Pinus silvestris*. HOy: Bruvik, Eidslandet 3/7 1966; 1 ♀ 4/7 1966; 1 ♀ on *P. silvestris*. Fana, Store Milde 10/7 1966; 1 ♀ on *Picea abies*.

Sympherobius fuscescens is new to VE, AAy, and HOy. This is also the first time it is reported from Western Norway. *S. fuscescens* has earlier been reported from a few localities scattered from AK to Nsi, Aspöck & Aspöck (1964) say it is found over the whole of Europe. *S. fuscescens* is confined to conifers.

FAM. CONIOPTERYGIDAE

The family Coniopterygidae has hitherto been sparsely represented in Norwegian museums and private collections. Only four genera with five species have earlier been recorded from Norway (Tjeder 1945, Greve 1966). During the last two summers I have examined a material consisting of more than 200 specimens, which indicates that at least some of the species belonging to this family are not scarce in some parts of the country.

Coniopteryx tineiformis Curt. 1834

List of records. VE: Kjære, Tjøme 4/6 1965; 1 ♂ on *Betula*, 18.6 1965; 1 ♀ on *Salix*, 15/7 1966; 1 ♀ on deciduous trees, 18/7 1965; 1 ♂ 6 ♀♀ on *Quercus*, *Fraxinus excelsior*, and *Betula* (A. Fjellberg). Tjøme 3/7 1966; 1 ♂ 40 ♀♀ 1 specimen on *Picea abies* (A. Fjellberg). AAy: Høvåg, Høvåg 21/7 1966; 4 ♀♀ on deciduous trees. HOi: Kvinherad, Uskedal 2/6 1966; 3 ♂♂ 1 ♀ on bushes. Kvinherad, Løfallstrand 6/6 1966; 3 ♂♂ 3 ♀♀ on *Alnus*. HOy: Åsane, Åstvedt 28/5 1966; 6 ♂♂ 1 ♀ on *Betula*, 18/6 1966; 21 ♂♂ 32 ♀♀ (A. Fjellberg). Åsane 26/6 1966; 11 ♂♂ 30 ♀♀ 1 specimen (A. Fjellberg). Åsane, Steinestø 10/6 1966; 1 ♂ 2 ♀♀. Bergen, Isdalen 9/6 1966; 2 ♂♂ 1 ♀ on bushes. Bergen 16/6 1966; 7 ♂♂ 8 ♀♀ 1 specimen (A. Fjellberg). Bømlo, Sakseid 27/6 1966; 3 ♂♂ 1 ♀ (B. Berland and T. Nielsen) Meland, Brakstad 25/6 1966; 4 ♀♀, 8/7 1966; 2 ♀♀. Bruvik, Eidslandet 3/7 1966; 1 ♂ 2 ♀♀.

Coniopteryx tineiformis has earlier only been reported from NTi and is thus not previously recorded from any of the localities reported above. It seems to be a common species, which is illustrated by the many finds in VE and HOy.

I think this species will prove to be one of our most common Neuroptera. According to the literature (Zeleny 1961, Meinander 1962, Aspöck & Aspöck 1964) this species has a wide distribution and can be found on both deciduous trees and conifers, as also proved to be the case with my material.

Coniopteryx pygmaea End. 1906

List of records. VE: Tjøme, Kjære 31/5 1965; 2 ♂♂ on *Pinus silvestris* (A. Fjellberg), 6/6 1965; 2 ♂♂ on *Pinus silvestris* (A. Fjellberg, det. A. Fjellberg).

Coniopteryx pygmaea has not earlier been reported from Norway. To find this species in Norway was not unexpected, however, as it has been reported from both Finland and Sweden (Meinander 1962) and Aspöck and Aspöck (1964) say that it is found all over Europe and in many parts of northern Asia. *C. pygmaea* is confined to conifers.

Heliococonis lutea Wall. 1871

List of records. VE: Tjøme, Kjære 3/7 1966; 1 ♂ on *Picea abies* (A. Fjellberg).

Heliococonis lutea has earlier only been reported from TRy (Tjeder 1945). In Finland the species is found scattered all over the country, (Meinander 1962). In Sweden it is reported north to Dalarna (Tjeder 1940, 1953).

H. lutea is confined to conifers and seems to have a preference for *Picea abies.*

FAM. CHRYSOPIDAE

Chrysopa ciliata Wesm. 1841

List of records. Ak: Asker, Hvalstad, 13/6 1940; 1 ♀ (F. Jensen, det. B. Tjeder). Bø: Hurum, Rødtangen 14/6 1959; 1 ♀ (J. Fjelddalen). VE: Tjøme, Eidene 15/6 1965; 1 ♂ (A. Fjellberg). Tjøme, Kjære 26/6 1965; 1 ♀ on deciduous trees, 27/6 1965; 1 ♂ 1 specimen, on deciduous trees, (A. Fjellberg) AAy: Høvåg, Høvåg 20/7 1966 1 ♂ 4 ♀♀, 21/7 1966 3 ♂♂ 5 ♀♀ on deciduous trees.

Chrysopa ciliata is only with certainty known from one place earlier in Norway, viz. Bø (Tjeder, 1944).

C. ciliata has a distinctly southern distribution in Scandinavia (Meinander, 1962) and is found in West and Central Europe (Aspöck & Aspöck, 1964). It is found in deciduous woods.

Chrysopa dorsalis Burmeister 1839

List of records. VE: Tjøme 3/7 1966; 1 ♂ on *Pinus silvestris,* 19/7 1966; 1 ♂ 2 ♀♀ on *Pinus silvestris* (A. Fjellberg, det. A. Fjellberg).

Chrysopa dorsalis is earlier only known from Bø (Tjeder 1944). Meinander (1962) says it is not common in Finland, and is found only in the southern part. In Sweden it is also known from only the southern part of the country (Tjeder 1940, 1953). *C. dorsalis* is found in most parts of Europe outside Scandinavia (Aspöck & Aspöck 1964). *C. dorsalis* is confined to conifers.

Chrysopa flava Scop. 1763

List of records. Ak: Oslo, Blindern 14/8 1958; 1 ♀ (Gussgård). VE: Tjøme 2/8 1965; 1 ♂ (A. Fjellberg), 23/7 1966; 1 ♂ (A. Fjellberg, det. A. Fjellberg). HOy: Bergen, Jernbanen 13/8 1951; 1 ♀ (det. B. Tjeder). Bergen 24/8 1954; 1 ♀ (H. Brattström, det. B. Tjeder), 19/8 1955; 1 ♀ (det. B. Tjeder). Bergen, Langhaugen 23/8 1965; 1 ♀ (A. Fjeldså).

Chrysopa flava is new to VE and HOy. It is probably not very rare as in addition to the new records I have seen several specimens in F. Jensen's collection from Ry. The closely related *Chrysopa vittata,* however, is more common.

C. flava is found in the whole of Europe (Aspöck & Aspöck 1964).

Chrysopa flavifrons Brauer 1851

List of records. Ry: Klepp, Reve 13/8 1939; 1 ♂ 1 ♀ (F. Jensen, det. B. Tjeder). SFi: Aurland, Åberget 3/7 1966; 1 ♀ on *Corylus avellana* (R. Larsen).

Chrysopa flavifrons has earlier been taken twice in Norway, viz. AAy at Hisøy and in SFi Aurland not far from the place where the new specimen was taken. (Tjeder 1943, 1944).

SUMMARY

The author gives a survey of fourteen species of Neuroptera and their Norwegian distribution. *Coniopteryx pygmaea* is reported for the first time from Norway. Records of the following species are of special interest: *Hemerobius micans, Wesmalius subnebulosus, Sympherobius fuscescens, Coniopteryx tineiformis, Heliococonis lutea, Chrysopa ciliata, C. dorsalis, C. flava,* and *C. flavifrons.*

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Distribution and Abundance of *Hylotrupes bajulus* L. (Col., Cerambycidae) and *Anobium punctatum* de Geer (Col., Anobiidae) along the Sognefjord in West Norway

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INTRODUCTION

Previous registrations have shown that the geographical distribution of *Hylotrupes bajulus* L. in Norway is limited to certain parts of Telemark and the coast to Skagerrak, as well as to the inner parts of the fjords of Western Norway (Bakke 1960). *Anobium punctatum* de Geer occurs in buildings on the west coast. It was decided to investigate dwelling houses in localities along the Sognefjord in order to study: (i) any possible connection between the macroclimate and the occurrence in houses of the two species; (ii) if the geographical distribution of *H. bajulus* is dependent on the climate.

The area along the Sognefjord was chosen for the investigation for the following reasons: (i) attacks of *H. bajulus* were registered in some parts of Sogn; (ii) meteorological data showed distinct differences of climate at comparatively short distances along the fjord; (iii) the density of dwellings is sufficient for adequate sampling in both outer and inner parts of Sogn.

The Sognefjord extends approximately 160 km between 5° and 7° 45′ E. and is orientated primarily east-west. The north latitude is approximately 61° 10′. The fjord is surrounded by high mountain ranges for almost its entire length, and the settlements are usually situated on a narrow strip close to sea level.

The investigation was carried out as far as possible in places where a meteorological station could be found. The dwelling houses were examined at 7 localities (Fig. 1). Sporadic registrations were carried out in areas between these localities to determine if both species were present.

The investigation was executed during 1961–63. Parts of this investigation were presented earlier (Knudsen 1966).

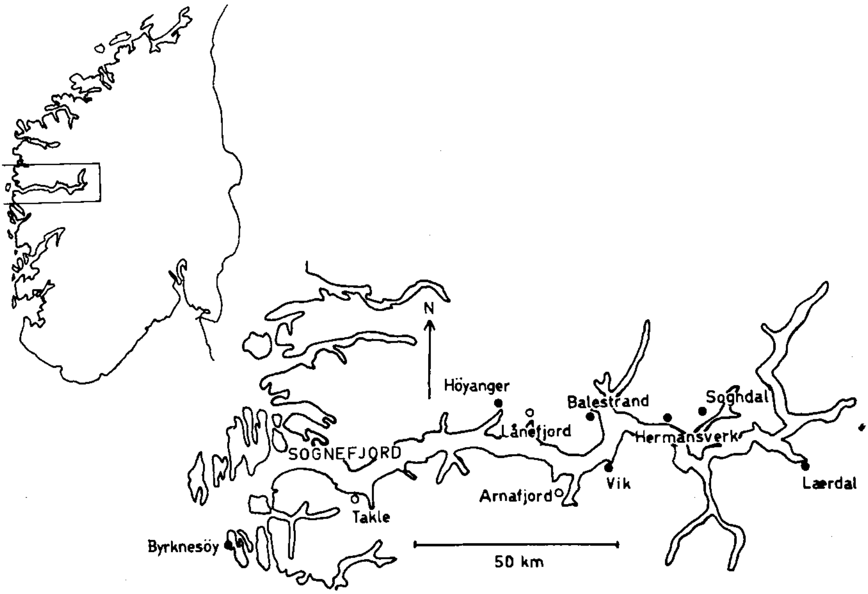

Fig. 1. The examination area in Sogn. The black dots mark the location of the study plots.

CLIMATE

Complete climatic observations were not available from all localities. Nevertheless, it was possible to estimate differences among locations by means of existing meteorological data. The climatic information was taken from Birkeland (1936, 1944), *Klimatabeller for Landbruket* (1955), and *Lufttemperaturen i Norge I* (1957), and data were obtained from The Norwegian Meteorological Institute.

TABLE I. Mean monthly and mean maximum monthly air temperature for the period 1931–60

Station	Mean T° C				Mean maximum T° C			
	May	June	July	August	May	June	July	August
Byrknesøy	9.0	11.4	14.3	14.2	11.7	14.0	16.9	16.6
Takle	9.3	12.1	14.8	14.2	12.6	15.4	18.1	17.1
Balestrand	10.2	13.3	15.4	14.6	13.8	17.0	18.8	17.5
Hermansverk	10.4	13.6	16.0	14.9	14.8	18.1	20.5	19.1
Sogndal	10.8	14.5	16.9	15.4	—	—	—	—
Lærdal	11.0	14.0	16.2	14.9	15.4	18.5	20.7	19.1

TABLE II. The number of days per year with mean air temperature above 15° C and mean maximum air temperature above 18° C for the period 1931–60

Station	Number of days with	
	Mean T above 15° C	Mean maximum T above 18° C
Byrknesøy	0	0
Takle	0	4
Balestrand	26	42
Hermansverk	46	69
Sogndal	60	—
Lærdal	50	78

TABLE III. The mean monthly relative humidity for the period 1901–30

Station	Relative humidity (%)			
	May	June	July	August
Byrknesøy	85	85	90	90
Balestrand	70	72	76	81
Lærdal	67	68	71	75

TABLE IV. Humidity factor (M) and the humidity factor (M_v) based on Martonne's formuıa, during periods with mean temperature above 3° C, 6° C and 10° C

Station	M	M_v		
		3° C	6° C	10° C
Byrknesøy	100	88	78	67
Balestrand	114	106	79	67
Hermansverk	55	43	39	35
Lærdal	27	22	21	22

The mean monthly air temperature and mean monthly maximum air temperature are generally available from most of the meteorological stations in Sogn. These meteorological data show that the inner parts of the fjord are considerably warmer than the coastal districts during the summer months (Table I). The number of days with relatively high temperature increases considerably with increasing distance from the coast (Table II). The change from coastal to continental climate is also underlined by the differences in air humidity (Table III). In the inner parts of the fjord, the conditions of temperature and humidity are almost at the same level as in the central parts of the country.

Martonne's humidity figure (M) (Hesselman 1932) and the humidity of the growing season (M_v), being Martonne's humidity figure adapted to a shorter period of the year (Lekander 1962), were used as a measure of climatic conditions:

$$M = \frac{N}{10 + T},$$

where N is the yearly precipitation in millimetres and T the mean annual air temperature.

$$M_v = \frac{365}{n_v} \times \frac{N_v}{10 + T_v},$$

where n_v is the number of days, N_v the precipitation in millimetres, and T_v the mean air temperature, during the growing season. The growing season, according to Lekander (1962), is defined as the time of the year when the 24-hour mean temperature is above 3° C. According to the Meteorological Institute (1957) the growing season is defined as the time of the year when the 24-hour mean temperature is above 0° C or 6° C. Table IV shows Martonne's humidity figure and the humidity in the growing season for some stations in the area of investigation. A humidity figure for the time when the 24-hour mean temperature was above 10° C was also calculated, owing to the high optimal temperature for *H. bajulus*.

METHODS

The dwelling houses were divided into four groups according to age:

Group	I:	6–15 years
«	II:	16–30 »
«	III:	31–50 «
«	IV:	above 50 years

Houses less than 6 years old were not included, as it was assumed that it would be difficult to discover attacks in buildings of that age.

At each locality the investigation was primarily carried out where the density of dwellings was highest. Within this limited area several groups consisting of 4–5 houses and representing most of the area were chosen. In some cases it was not possible to examine the designated houses. In such cases an adjacent house was selected for study.

Attacks in lofts, in living rooms, and in cellars were examined separately. It was later decided to delete living rooms from the study because of the diverse materials used in walls and ceilings. In general, the lofts in the study are of similar construction. They consist of one room which is well insulated, from the underlying part of the house. Thus, outer climatic conditions essentially influence the climate of the lofts. The roof covering the rafters consists of one layer of planks, tarpaper, and an outside roof cover.

The frequency and extent of attack were used to express the existence of the species at each locality. The frequency of attack was expressed as the attacks in percentage of the total number of lofts or cellars examined at each locality. Based on the quantity of wood damaged in each loft in relation to the size of the loft the attacks were graded in two classes, slight and severe for *A. punctatum;* and in three classes, slight, moderate, and severe for *H. bajulus*. However, this evaluation of damage is a gross estimate, but with some reserve the result was used, in conjunction with the frequency of attack, to characterize a given locality.

MATERIAL

Between 20–30% of the houses were usually examined within the limited area at each locality (Table V). The number of lofts and cellars examined varied at each locality, because loft and cellar in the same house were not always suitable for investigation. At Byrknesøy and Vik lofts from houses older than 30 years form the greatest part of the material, while in Hermansverk the situation is the opposite (Tables VI and VII). As to the number of cellars examined those older than 30 years are dominant in the material from Vik and Lærdal while newer cellars are more frequently represented in the material from Hermansverk (Table IX).

In Høyanger, at the time of the investigation, no houses were older than 50 years. For that reason results from this locality cannot be used for comparison purposes without reservation.

TABLE V. Number of examined lofts and cellars in per cent of existing number of houses at each locality

Locality	Number of houses	Lofts examined %	Cellars examined %
Byrknesøy	85	28	27
Høyanger	180	14	14
Balestrand	100	25	30
Vik	140	22	24
Hermansverk	100	29	28
Sogndal	140	21	16
Lærdal	125	19	22

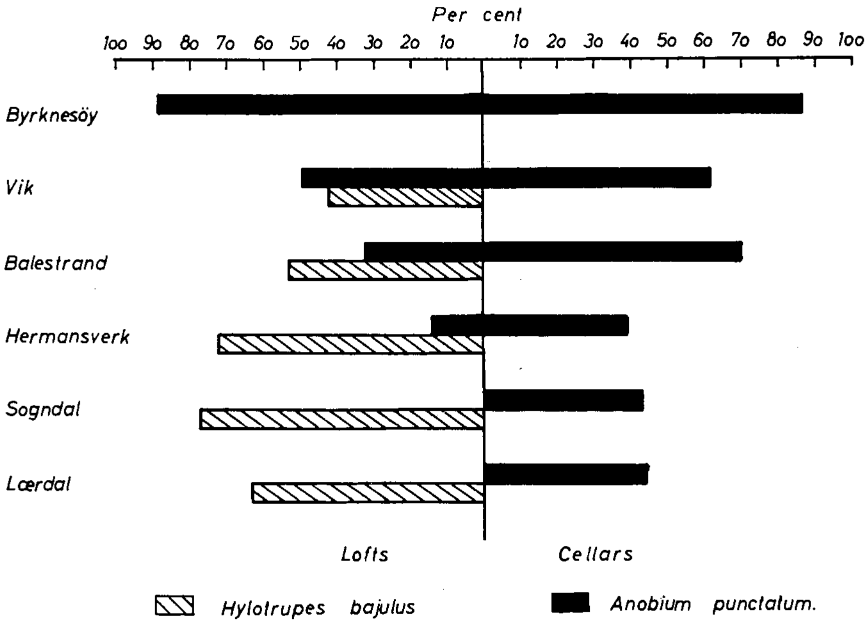

Fig. 2. The frequency of attacks in lofts of *A. punctatum* and *H. bajulus*, and of *A. punctatum* in cellars.

RESULTS

Geographical distribution

A. punctatum is distributed throughout the area of investigation. However, its occurrence in lofts and cellars varied a great deal. H. *bajulus* occurred in the central and inner districts. The outer limit for its distribution is Lånefjord at the north side, and Arnafjord at the south side (Fig. 1.) This species was also found up to a height of 300–400 metres above sea level.

Attacks in lofts

Both species attacked older houses more frequently. However, as the frequency of attack by one species decreases, the frequency of attack by the other species increases (Fig. 2). *A. punctatum* occurred more frequently in lofts at the coast, but decreased in number with increasing distance from the coast. Also, there was considerable difference in frequency of attack and, to a certain extent, in the degree of damage (Table VI). Apparently, Høyanger deviates completely from the general trend. However, a comparison of the three youngest age groups indicates some similarity. It should

TABLE VI. *A. punctatum* in lofts of houses in different age groups.[1] A: slight damage, B: severe damage

Locality		Number of lofts with attack in each age group — Age of lofts in years: 6–15		16–30		31–50		>50		Total	
Byrknesøy	A		3		3		2		—		8
	B		—		—		4		9		13
	Total	(5)	3	(4)	3	(6)	6	(9)	9	(24)	21
Høyanger	A		—		1		3		—		4
	B		—		—		2		—		2
	Total	(5)	—	(9)	1	(11)	5	(—)	—	(25)	6
Balestrand	A		—		—		2		1		3
	B		—		—		—		5		5
	Total	(6)	—	(6)	—	(7)	2	(6)	6	(25)	8
Vik	A		1		3		3		2		9
	B		—		—		1		5		6
	Total	(6)	1	(6)	3	(11)	4	(8)	7	(31)	15
Hermansverk	A		1		1		—		1		3
	B		—		—		—		1		1
	Total	(9)	1	(9)	1	(5)	—	(6)	2	(29)	4

[1] The numbers of lofts examined are in parentheses.

be taken into account that the population in Høyanger is quite young compared to the other localities. During the investigation, *A. punctatum* was not found in lofts at Sogndal and Lærdal.

With respect to *H. bajulus*, an increase in frequency of attack and amount of damage was found at the three inner localities compared to Balestrand and Vik (Table VII). The fact that comparatively new houses were attacked more often at the inner localities suggests that the populations were largest here (Table VIII).

In 92% of the cases, *H. bajulus* was found in the rafters of attacked lofts while the figures for roof panelling and floor are 21% and 34% respectively.

Attacks in cellars

The occurrence of *A. punctatum* in cellars was also greatest at the coast, but the number of attacked cellars did not decrease to the same extent as was the case with lofts (Table IX). On Byrknesøy *A. punctatum* occurred

TABLE VII. *H. bajulus* in lofts of houses in different age groups.[1] A: slight damage, B: moderate damage, C: severe damage

Locality		Number of lofts with attack in each age group									
		Age of lofts in years									
		6–15		16–30		31–50		>50		Total	
Balestrand	A		1		–		2		1		4
	B		–		2		2		2		6
	C		–		–		3		–		3
	Total	(6)	1	(6)	2	(7)	7	(6)	3	(25)	13
Vik	A		–		1		2		3		6
	B		1		–		2		3		6
	C		–		–		–		1		1
	Total	(6)	1	(6)	1	(11)	4	(8)	7	(31)	13
Hermansverk	A		4		3		2		–		9
	B		1		2		1		2		6
	C		1		–		1		4		6
	Total	(9)	6	(9)	5	(5)	4	(6)	6	(29)	21
Sogndal	A		–		6		–		–		6
	B		–		4		2		1		7
	C		–		1		2		7		10
	Total	(5)	–	(12)	11	(5)	4	(8)	8	(30)	23
Lærdal	A		2		3		1		2		8
	B		–		1		1		1		3
	C		1		–		1		3		4
	Total	(5)	2	(6)	4	(5)	3	(8)	6	(24)	15

[1] The numbers of lofts examined are in parentheses.

as frequently in lofts as in cellars, while in the other localities, except Høyanger, a considerably higher frequency of attack in cellars was observed (Fig. 2).

H. bajulus was found very sporadically in cellars, and the attacks were insignificant. Apparently conditions for development of the insects in this part of the houses were poor.

DISCUSSION

The investigation indicates that both the occurrence of *A. punctatum* in houses and the geographical distribution of *H. bajulus* are governed by the climate. The climate during the winter is for several reasons not expected to be decisive in this respect. The parts of Sogn where *H. bajulus* occurs have cooler winters than the rest of the fjord area. Besides, both species were found to attack wooden materials out of doors, where they are exposed

TABLE VIII. *H. bajulus*. The percentage of infested lofts for houses younger and older than 30 years old

Locality	The percentage of infested lofts	
	<30 years	>30 years
Balestrand	25	77
Vik	17	58
Hermansverk	61	91
Sogndal	65	92
Lærdal	55	69

TABLE IX. *A. punctatum* in cellars of houses in different age groups.[1] A: slight damage, B: severe damage

Locality		Number of attacked cellars in each age group									
		Age of cellars in years									
		6–15		16–20		31–50		>50		Total	
Byrknesøy	A		3		1		—		—		4
	B		—		3		7		6		16
	Total	(6)	3	(4)	4	(7)	7	(6)	6	(23)	20
Høyanger	A		—		—		2		—		2
	B		—		—		—		—		—
	Total	(5)	—	(9)	—	(11)	2		—	(25)	2
Balestrand	A		—		4		—		1		5
	B		—		2		6		8		16
	Total	(6)	—	(9)	6	(6)	6	(9)	9	(30)	21
Vik	A		2		—		5		4		11
	B		—		—		6		4		10
	Total	(6)	2	(9)	—	(12)	11	(10)	8	(34)	21
Hermansverk	A		—		2		1		1		4
	B		—		1		2		4		7
	Total	(8)	—	(9)	3	(5)	3	(6)	5	(28)	11
Sogndal	A		1		2		2		3		8
	B		—		—		—		2		2
	Total	(2)	1	(8)	2	(4)	2	(9)	5	(23)	10
Lærdal	A		—		1		—		3		4
	B		—		—		3		5		8
	Total	(7)	—	(4)	1	(6)	3	(10)	8	(27)	12

[1] The number of cellars examined are in parentheses.

to a climate rougher than in the houses. It seems more likely, therefore, that the climatic conditions in the summer are the determining factor.

The decreasing abundance of *A. punctatum* with increasing summer temperature (Fig. 2 and Table VI) is in agreement with the temperature preference found by Becker (1943), when it is borne in mind that the temperature in lofts is considerably higher, 25–35° C (Rasmussen 1961), than the outside air temperature. The lack of the species in lofts at the inner localities may also be caused by a combination of high temperature and low relative air humidity. The more frequent attacks in cellars compared to lofts in the inner parts of the fjord is apparently due to the fact that the climate in cellars is less influenced by the outer climate than in lofts.

The high incidence of *A. punctatum* in cellars at the coast (Fig. 2 and Table IX) suggests that at these latitudes the species is able to fulfil development at lower temperatures than Becker (1943) found. Temperature measurements in this part of dwellings are not available. But the air temperature in summer is not especially high at the coast (Table I), and the temperature in cellars is lower than the outside temperature at this time of the year.

The occurrence of *H. bajulus* in lofts was most frequent in localities with the highest summer temperatures. Within the distribution area there appears to be a trend towards increasing frequency of attack and amount of damage with increasing duration of the summer periods with comparatively high temperatures (Tables I, II, VII, and VIII). This observation is in agreement with previously known optimal conditions for the development of the different stages of *H. bajulus* (Steiner 1937, Schuch 1938, Becker 1950, Dürr 1957). Especially when this is seen in relation to the temperatures given by Rasmussen (1961), should shorter larval periods in the inner parts of the fjord be expected. This involves more frequent laying of eggs, increased number of individuals, and, consequently, more severe attacks. The sporadic cases of attacks in cellars (see also Butovitsch 1951) may also be a consequence of the temperature preference of the species.

The variation in appearance of the two species in lofts (Fig. 2) supports the assumption that both species are influenced by the macroclimate. At the optimal developmental temperature for *H. bajulus*, the development in *A. punctatum* is arrested (Schuch 1938, Becker 1943). At the coast there are obviously very favourable conditions for *A. punctatum*, even in lofts. This indicates that the temperatures are not high enough for *H. bajulus* to accomplish development. In the inner parts the situation in lofts is reversed.

The connection between *A. punctatum* and *H. bajulus* has previously been discussed by Wichmand (1941), who writes that a heavy infestation of *A. punctatum* restrains the development of an attack of *H. bajulus*. However, according to the investigation in Sogn the reason appears to be different demands on the climatic factors rather than competition.

High relative air humidity is favourable for both species. Since the humidity decreases with increasing distance from the coast, *H. bajulus* is not limited to the inner parts of the fjord by this climatical factor. This also indicates that the temperature conditions during the summer are decisive for the distribution of *H. bajulus* in Sogn. In England too this seems to be the case (Hickin 1963, p. 248).

From the present investigation it is not possible to decide which of the stages of *H. bajulus* are unable to complete the development in the areas closest to the coast. Based on the results obtained by Steiner (1937) and the temperature in the outer part of the Sognefjord, the eggs will probably require a long time to hatch. Because of the short summer season the temperature at the time of hatching may have fallen so low that the egg larvae stop eating after a short time or possibly do not start eating at all. It is reasonable to assume, therefore, that the egg larvae do not get nutrition enough to survive the inactive period during winter.

The imago of *H. bajulus* has not been studied to the same extent as the other stages. It is known, however, that the beetles are very active when the temperature reaches 25–30° C (Lekander 1955). For that reason both copulation and oviposition may be inhibited by the low temperature at the coast.

By means of Martonne's humidity figure and the humidity of the growing season (Table IV) Lekander (1955, 1962) characterized the distribution area of *H. bajulus* in Sweden. Bakke (1960) did not find any connection between Martonne's humidity figure and the distribution of the species in Norway, and Holm and Ekbom (1958) maintain that this humidity figure does not explain the distribution of *H. bajulus*. Neither in Sogn was such correlation found (Table IV). The humidity figure of the growing season did not show a similar relation to the distribution of *H. bajulus* as that obtained by Lekander (1962), even when the formula of the humidity figure of the growing season was used on two still narrower periods of the year (Table IV).

SUMMARY

The present investigation deals with a probable connection between the macroclimate and the occurrence and abundance of *Anobium punctatum* de Geer and *Hylotrupes bajulus* L. in dwelling houses. The influence of the macroclimate on the geographical distribution of *H. bajulus* was also investigated. Attacks in lofts and cellars of dwelling houses along the Sognefjord in Western Norway were studied.

A. punctatum was found throughout the area of investigation, at the coast as frequently in lofts as in cellars, while the frequency of attack in lofts decreased with increasing distance from the coast.

H. bajulus was found in the middle and inner parts of the fjord area, where it mainly occurs in lofts. The districts where *H. bajulus* is present have the highest mean temperatures in the area investigated, and the longest periods with relatively high temperatures during the summer.

The distribution of *H. bajulus* is probably limited to the inner part of the fjord because of the low temperature and short summer season in the outer part. Attacks of *A. punctatum* are less abundant in lofts in the inner part of the fjord, apparently because of the combination of high temperatures and low relative air humidity during the summer.

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De nordiske arter av slekten Myllaena Er. (Col., Staphylinidae)

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(Mottatt 21. mars 1967)

I sitt arbeid over de britiske *Myllaena*-arter nevner Matthews (1883) bl. a. artene *gracilicornis* Fairm., *fowleri* Matth., *kraatzi* Sharp og *elongata* Matth. Av disse fire artene har Joy (1932) bare med *kraatzi* og *elongata*. De to andre, som bare er funnet i få eksemplarer for mange år siden, har det ikke lykkes ham å identifisere.

De to arter av denne gruppen som vi har i Norden, er utvilsomt de samme som Joy har, men de går under andre navn, idet den nordiske *gracilicornis* er den britiske *kraatzi*, og den nordiske *kraatzi* er den britiske *elongata*.

Da Sharp (1871) introduserte navnet *kraatzi*, skjedde det ved at han i sin katalog omdøpte *elongata* Kr. til dette nye navn uten noen beskrivelse. Derimot har Matthews (1883) gitt en utførlig beskrivelse av arten.

Allen har undersøkt Sharps typematerial av *kraatzi* og har overlatt meg et engelsk eksemplar som stemmer helt med de nordiske *gracilicornis* som jeg har sett.

Matthews (1883) nevner at *gracilicornis* skiller seg ut fra alle de andre arter ved de meget lange og meget slanke, sorte følehorn. Han nevner også at *kraatzi* har vært oppgitt som synonym til *gracilicornis*, men at det ikke er noensomhelst likhet mellom dem.

Av Jarrige har jeg fått en ♂ av *gracilicornis*. Den er sterkt mørkfarget som *kraatzi*, men følehornene er betydelig lengre og slankere, brystskjoldet er sterkere avsmalnet framover og penis er helt forskjellig.

Om typemateriale av *gracilicornis* har vært undersøkt kjenner jeg ikke til, men inntil annet måtte bli påvist er det rimelig å følge Matthews, slik at altså den nordiske *gracilicornis* blir *kraatzi*.

Tottenham, som har undersøkt dyr fra Matthews' samling, har sett et av mine engelske eksemplarer av *elongata* og bekreftet bestemmelsen. Colin

Johnson har latt meg se en rekke eksemplarer av *elongata* fra Bewdley, en lokalitet som Fowler (1888) nevner for denne art. Alle disse eksemplarer stemmer med danske eksemplarer bestemte som *kraatzi*, som Victor Hansen har latt meg se.

BESTIMMUNGSTABELLE DER NORDISCHEN *MYLLAENA*-ARTEN

1\. Halsschild und Deckflügel rotgelb, Kopf und besonders Hinterkörper oft dunkler, 7.–10. Fühlerglieder so lang oder ein wening länger als breit, Deckflügelsaum kürzer als der Halsschild, Länge 2–2.5 mm. Penis und Samenkapsel wie in Fig. 6 .... *brevicornis* Matth.
– Körper schwarz oder braun 2
2\. 6.–9. Fühlerglieder deutlich länger (bei *hyperborea* bisweilen kaum länger) als breit 3
– 6.–9. Fühlerglieder nicht oder kaum länger als breit 7
3\. Deckflügelsaum etwa so lang als der Halsschild, Hinterkörper nach hinten stark zugespitzt 4
– Deckflügelsaum kürzer als der Halsschild 5
4\. Grösser (2.5–3 mm), breiter, Fühler etwas dicker, Halsschildseiten stärker gerundet, Hinterrand innerhalb der Hinterecken stärker ausgebuchtet, Penis und Samenkapsel wie in Fig. 1 .... *dubia* Grav.
– Kleiner (2–2.5 mm), schmaler, Fühler schlanker, Halsschildseiten schwächer gerundet, Hinterrand innerhalb der Hinterecken schwächer ausgebuchtet, Penis und Samenkapsel wie in Fig. 3 .... *intermedia* Er.
5\. Kleiner (2–2.2 mm), Fühler kürzer und etwas dicker, Halsschild nach vorne stärker verengt, Hinterkörper stärker zugespitzt, letztes Ventralsegment des ♀, Penis und Samenkapsel wie in Fig. 2 .... *hyperborea* A. Str.
– Grösser (2.5–3 mm), Fühler länger und schlanker, Halsschild nach vorne schwächer verengt, Hinterkörper schwächer zugespitzt 6
6\. Tiefschwarz, Fühler braunschwarz, Beine gelbbraun, Schenkel und Schienen meist braunschwarz, Fühler dicker, Endglied høchst doppelt so lang als breit, letztes Ventralsegment des ♀, Penis und Samenkapsel wie in Fig. 4 .... *kraatzi* Sharp
– Braun, Fühler und Beine fast gleichfarbig braungelb, Fühler schlanker, Endglied mehr als doppelt so lang als breit, letztes Ventralsegment des ♀, Penis und Samenkapsel wie in Fig. 5 .... *elongata* Matth.
7\. Grösser (1.5–2 mm), Fühler gegen die Spitze verdickt, Deckflügelsaum etwa so lang als der Halsschild, Penis und Samenkapsel wie in Fig. 7 .... *gracilis* Matth.
– Kleiner (1.2–1.6 mm), Fühler gegen die Spitze nicht verdickt 8
8\. Halsschild nach hinten nicht oder kaum verengt, Deckflügelsaum etwa so lang als der Halsschild, Länge 1.4–1.6 mm, Penis und Samenkapsel wie in Fig. 8 .... *minuta* Grav.
– Halsschild nach hinten deutlich verengt, Deckflügelsaum kürzer als der Halsschild 9
9\. Tiefschwarz, Halsschildseiten stärker gerundet, Deckflügelsaum etwa 2/3 der Halsschildlänge, Länge 1.2–1.5 mm, Penis und Samenkapsel wie in Fig. 10 .... *masoni* A. Matth.
– Braun bis hellbraun, Halsschildseiten schwächer gerundet, Deckflügelsaum etwa 4/5 der Halsschildlänge, Länge 1.2–1.5 mm, Penis und Samenkapsel wie in Fig. 9 .... *infuscata* Kr.

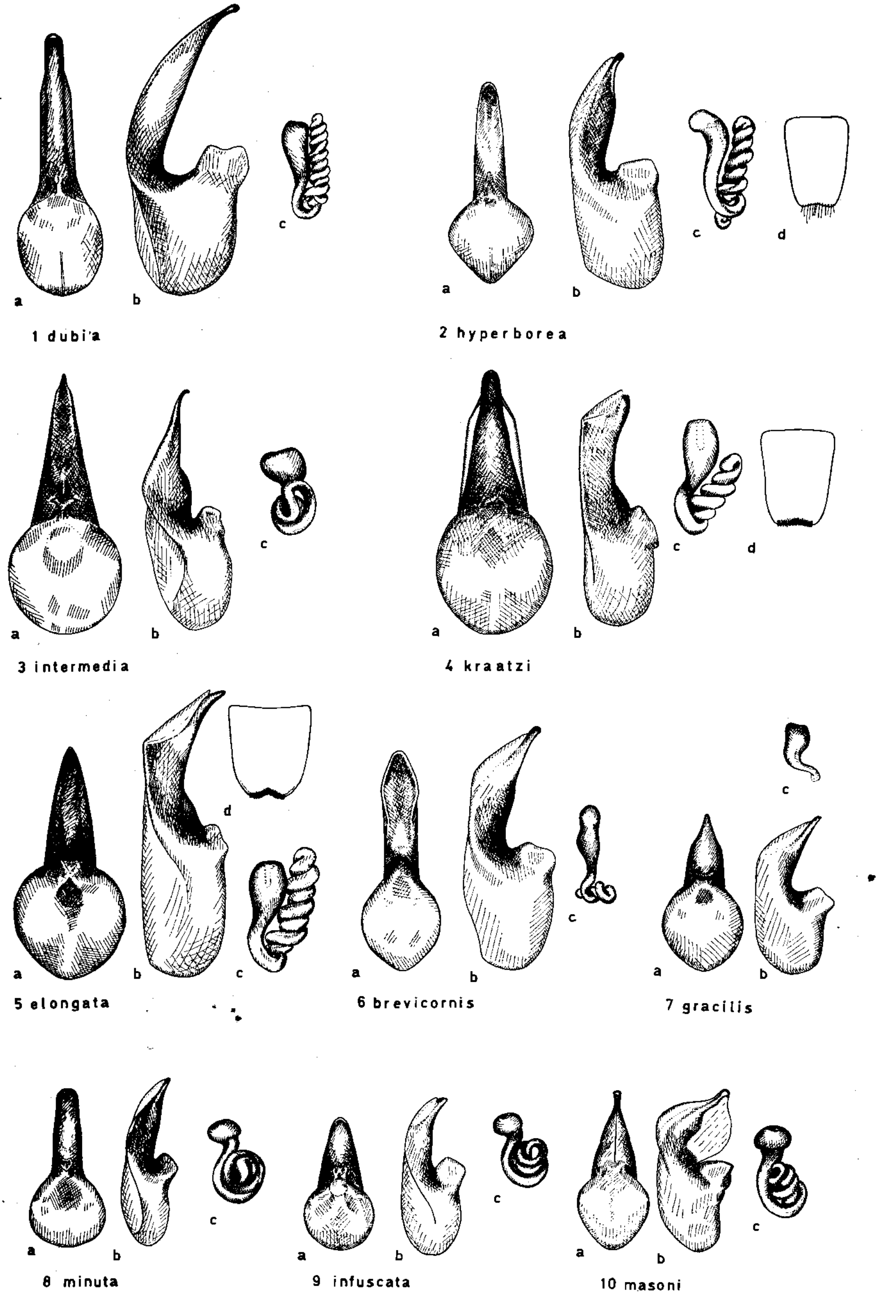

Fig. 1–10. a. Penis, Ventralansicht, b. Penis, Lateralansicht, c. Samenkapsel, d. Letztes Ventralsegment des ♀.

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ZUSAMMENFASSUNG

Die nordischen Arten der Gattung Myllaena Er. (*Col.*, *Staphylinidae*)

Der Verfasser macht darauf aufmerksam dass die zwei Arten der Gattung *Myllaena* Er. die in Norden für *gracilicornis* Fairm. und *kraatzi* Sharp gehalten worden sind, seiner Ansicht nach *kraatzi* Sharp bzw. *elongata* Matth. sind.

Eine Bestimmungstabelle der nordischen Arten der Gattung mit Zeichnungen der Genitalien wird gegeben.

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Fleas (Siphonaptera) New to Norway

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There is little information on the flea fauna of Norway, and no review of the recorded species has hitherto been made. Smit (1954 & 1957) has indicated which of the fleas in Denmark and the British Isles also occur in Norway. In addition to these, a few species are found in Norway that are not recorded in the two countries. From Norway records of 27 species of fleas have been published. This paper adds 8 species. On the basis of the flea fauna in adjacent territories we would expect to find upwards of 50 species of fleas in this country.

The described collection of fleas is kept at the Zoological Museum, Oslo.

Doratopsylla dasycnema dasycnema (Rothschild 1897).

5 ♂♂ 1 ♀ ex *Sorex araneus* Linne, 1758 (leg. R. Mehl) Nes. Stangvik, Nordmøre 12 & 13 Aug. 1966.
Distribution in Fenno-Scandia: Denmark, Finland (Smit, 1957) and Sweden (Brinck, 1966).
Principal host: *Sorex* spp.

Paraceras melis melis (Walker 1856)

2 ♀♀ (leg. JAP) ex *Meles meles* (Linne 1758) killed by car near Moss, Østfold 26 Sept. 1966.
Distribution in Fenno-Scandia: Denmark, Finland, and Sweden (Smit 1957).
Principal host: *M. meles.*

Dasypsyllus gallinulae gallinulae (Dale 1878)

7 ♂♂ 14 ♀♀ (leg. R. Mehl) reared from a nest of *Aegithalos caudatus* (Linne, 1758) collected 25 May 1956, Røen, Kvanne, Nordmøre. The nest was situated in the top of a birch several meters above the ground.

5 ♂♂ 1 ♀ (leg. R. Mehl) ex *Prunella modularis* (Linne 1758), Akerøya, Hvaler, Østfold, 1 May 1965, on a migrating bird.
1 ♂ (leg. R. Mehl) ex *Parus major* Linne 1758, Akerøya, Hvaler, Østfold 9 April 1966, presumably a bird not breeding on the island, perhaps migrating.
Distribution in Fenno-Scandia: Denmark, Finland (and Iceland), (very common on the British Isles) (Smit 1957).
Hosts: A large number of birds, principally those with nests in low positions.

Megabothris turbidus (Rothschild 1909)

1 ♂ 1 ♀ ex *Apodemus sylvaticus* (Linne 1758) (leg. LB), near Flateby, Enebak, Akershus 6 and 13 Nov. 1966.
Distribution in Fenno-Scandia: Denmark, Finland (Smit 1957), and Sweden (Jellison 1962).
Principal hosts: *A. sylvaticus* and *Clethrionomys glareolus* (Schreber 1780).

Megabothris walkeri (Rothschild 1902)

1 ♀ (leg. Zoological lab., Oslo) host unknown, Åven, Råde, Østfold 7 June 1961.
2 ♂♂ (leg. ASJ) ex *Lemmus lemmus* (Linne 1758), Trondheim, (in the city), Sør-Trøndelag 19–23 Okt. 1963.
Distribution in Fenno-Scandia: Denmark and Finland (Smit 1957).
Hosts: *Clethrionomys glareolus*, *Microtus agrestis* (Linne 1761), and *Arvicola terrestris* (Linne, 1758).

Ceratophyllus delichoni Nordberg, 1935

Many specimens from nests of *Delichon urbica* (Linne 1758) (leg. R. Mehl) on a building, Svanvollen, Øvre-Pasvik, Finnmark 23 July 1966.
Distribution in Fenno-Scandia: Finland and North-East Sweden (Smit, 1956).
Host *D. urbica*.

Ceratophyllus lunatus lunatus Jordan & Rothschild, 1920

7 ♂♂ 5 ♀♀ ex *Mustela erminea* Linne, 1758 (ex. coll. GL) Valdres, Oppland 27 March 1964.
1 ♂ 1 ♀ ex *Mustela erminea* (leg. LB) Fiskevann, Øvre-Pasvik, Finnmark 18 June 1966.
Distribution in Fenno-Scandia: Finland (Jellison 1962) and Sweden (Wagner 1933).
Principal host: *M. erminea*.

Ceratophyllus borealis Rothschild, 1902

1 ♀ (leg. ØV) found on the ground, Akerøya, Hvaler, Østfold 2 May 1965. Distribution in Fenno-Scandia: Finland (and Iceland) (Smit 1957). Hosts: in birds' nests on rocks and cliffs, and under stones in cool places.

SUMMARY

This paper adds 8 to the 27 flea species previously recorded from Norway: *Doratopsylla d. dasycnema* (Rothschild, 1897); *Paraceras m. melis* (Walker, 1856); *Dasypsyllus g. gallinulae* (Dale, 1878); *Megabothris turbidus* (Rothschild, 1909); *Megabothris walkeri* (Rothschild, 1902); *Ceratophyllus delichoni* Nordberg, 1935; *Ceratophyllus l. lunatus* Jordan & Rothschild, 1920; and *Ceratophyllus borealis* Rothschild, 1902.

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Håkan Lindberg

in memoriam

19. august 1966 døde professor Håkan Lindberg, 68 år gammel. Med ham er en av de mest kjente entomologene i Norden gått bort.

Håkan Lindberg ble student i 1916, og disputerte i 1939. Allerede i 1923 ble han knyttet til Universitetets Entomologiske Museum, Helsingfors og ble universitetsprofessor i entomologi i 1954. Lindberg har arbeidet med forskjellige insektgrupper, først og fremst Hemiptera og Coleoptera, men har også gitt betydelige bidrag til kunnskapen om den lite kjente orden Strepsiptera. Hans hovedinteresse var ved siden av taksonomi og faunistikk, feltøkologi, og han var en av nordens fremste feltentomologer.

Håkan Lindberg var en sterk personlighet og en forgrunnsfigur innen nordisk entomologi. Han vil bli dypt savnet.

Ragnhild Sundby.

Bokanmeldelser

Hansen, Victor 1966. Biller XII. Træbukke. Larverne ved Sv. G. Larsson. Danmarks fauna, 73 (228 p.).
Hansen, Victor 1966. Biller XIII. Smældere og Pragtbiller. Larverne ved K. Henriksen. Danmarks fauna, 74 (179 p.).
Begge G. E. C. Gads Forlag, København.

Ikke mer enn ca. et år etter at snutebillebindet ble utgitt kommer nå to nye bind, som avløser de tidligere av henholdsvis A. C. Jensen-Haarup og K. Henriksen i 1914 og K. Henriksen i 1913.

De nye bind er, bortsett fra larvedelen i bind 74, helt selvstendige arbeider, som sedvanlig med bestemmelsestabeller, utførlige beskrivelser, glimrende tegninger og, ikke det minst viktige, fyldige opplysninger om funnforhold.

Med disse bind har Victor Hansen nå gjort den beundringsverdige prestasjon å behandle samtlige billefamilier, et arbeid som omfatter ca. 4800 sider med ca. 2000 tegninger.

Enestående for bestemmelsesverker som dette er den omfattende behandling larvene har fått. Her har særlig K. Henriksen, Sv. G. Larsson og B. Bier Pettersen nedlagt et stort arbeid.

Andreas Strand

Larsson, Sv. G. 1966. Insekter. Almindelig del. Danmarks Fauna *71*. G. E. C. Gads Forlag, Kjøbenhavn (313 p.).

Føremålet med dette nye bindet i Danmarks Fauna er å tene som ei generell innleiing til dei bind av serien som omhandlar dei einskilde insektordenar.

Omlag første halvpart av boka gir ei kort innføring i insektmorfologi, -anatomi, -fysiologi, og ontogenese (individutvikling). Det er også tatt med godt to sider om insektklassens fylogenese. Men å gi eit oversyn over insektfylogenesen på 2 sider er nok bortimot umogeleg, — noko som også viser seg ved at t.d. ein så viktig orden som Lepidoptera ikkje er nemnt. Eit litt større avsnitt om fylogenesen trur eg hadde vore nyttig fordi det er ein del av grunnlaget for inndeling i hovudgrupper og for rekkefølgja av gruppene i insektsystematikken.

Siste halvpart av boka er eit oversyn over insektsystematikken. Her er det med ein bestemmelsestabell til orden for insekta. Det er ein stor fordel at tabellen også omfattar larvestadiene, og også dei høgaste systematiske einingar for andre ledddyr enn insekt. Men dette fører samstundes til at nøkkelen blir svært omfattende og noko tung i bruk med heile 103 dobbeltledd.

Eit positivt trekk i det systematiske oversynet er at det er lagt stor vekt på små og lite kjende ordenar, medan slike som er godt dekka av andre bind i serien har fått kortare omtale. Strepsiptera har t.d. fått fleire sider enn Coleoptera. Gledeleg er det også at det er lagt stor vekt på larvestadiene.

Boka er skriven i ein konsentrert stil, det er difor forbausande mykje det har blitt plass til på dei vel 300 sidene. Etter kvart avsnitt er det korte lister med utvalde litteraturtilvisingar. Med få unntak er dei 110 figurane klare, svært gode strekteikningar.

Danmarks Fauna er ein overlag viktig serie av handbøker, ikkje berre for danske zoologar, men for zoologar i alle dei nordiske land. Utgiinga har nå nådd fram til bind 74, av desse omhandlar over 40 insekt. Sven. G. Larssons bok er eit nyttig bindeledd mellom alle desse insektbinda i serien.

Gudmund Taksdal.

RETTELSE

Istedenfor *Anabolia soror* Etn. på s. 15 og 16, Norsk ent. Tidsskr. 13, hefte 1—2, 1965 skal stå *Anabolia soror* McLachl.

RETTLEDNING FOR FORFATTERE

Artikler som ønskes inntatt i Norsk entomologisk Tidsskrift, sendes redaktøren, og skal fortrinnsvis omfatte originale undersøkelser.

Manus må være maskinskrevet på en side av papiret med dobbel linjeavstand, og med en marg på minst 2.5 cm. Fotnoter bør unngås, og kun ord som skal *kursiveres* må være understreket. Tabeller skrives hver for seg på egne ark, og tekst til illustrasjoner samles på ett (evnt. flere) ark. Plaseringen av tabeller og illustrasjoner avmerkes i margen på manus. Alle artikler, med unntakelse av korte meddelelser, forsynes med et sammendrag. Artikler bør være skrevet på engelsk, fransk eller tysk, og bare unntakelsesvis på norsk med et sammendrag på et av de andre språk. I tillegg til norsk tekst bør figurer og tabeller ha tekst på samme fremmedspråk som sammendraget.

Tabeller nummereres fortløpende med romerske tall, og forsynes med en kort, forklarende tittel. Overskrifter til kolonnene må være kortfattet og presise.

Illustrasjoner nummereres fortløpende med arabiske tall. Tegninger må være utført med tusj, og tekst til diagrammer skrevet med sjablong. Strekene må være tilstrekkelig tykke til at figuren kan forminskes. Fotografier må ha skarpe kontraster, og bør monteres på papir eller tynn kartong.

Referanser. Fortegnelse over benyttet litteratur settes til slutt i manus, og ordnes alfabetisk etter forfatternavn. I teksten henvises til litteraturlisten ved å angi forfatterens navn og trykkeår for arbeidet. Hvis forfatteren har utgitt flere arbeider samme år, nummereres disse med a, b, c, o.s.v. Etter forfatternavnet i litteraturlisten settes avhandlingens trykkeår, dens tittel, evnt. tidsskriftets navn, bind og sidehenvisning. Forkortelse av tidsskriftnavn bør følge *World List of Scientific Periodicals.* For bøker angis forlag, trykkested og det totale antall sider. Til del av en bok refereres som vist i siste eksempel nedenfor.

Eksempler:

LØKEN, A. 1964. Social wasps in Norway (Hymenoptera, Vespidae). *Norsk ent. Tidsskr.* 12: 195–218.

SCHWARTS, R. J. 1955. *The complete dictionary of abbreviations* T. Y. Crowell Co., New York. (211 p.).

WHITMAN, L. 1951. The arthropod vectors of yellow fever, p. 229–298. *In* K. STRODE, (ed.), *Yellow fever.* Mc Graw-Hill, New York and London.

Det henstilles til forfatterne at de ved angivelse av den geografiske utbredelse av norske arter benytter den inndeling i faunistiske områder som er utarbeidet av A. STRAND, 1943. *Norsk ent. Tidsskr.* 6: 208–224.

Tilføyelser eller *rettelser* i korrekturen, som belaster trykningskontoen uforholdsmessig, vil bli debitert forfatteren. Forfatteren får 75 særtrykk gratis. Bestilling på større antall må innsendes sammen med korrekturen.

NORSK ENTOMOLOGISK FORENING

ser sin hovedoppgave i å fremme det entomologiske studium i Norge, og danne et bindeledd mellom de interesserte. Søknad om opptagelse i foreningen sendes formannen. Medlemskontingenten er for tiden kr. 20.— pr. år. Medlemmer får tidsskriftet fritt tilsendt.

Styre

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SÆRTRYKK OG AVHANDLINGER TILSALGS FRA N.E.F.

K. HAANSHUS: Fortegnelse over Norges Lepidoptera. Norsk ent. Tidsskr. 3, 1933. Kr. 2.—.

H. HOLGERSEN: Bestemmelsestabell over norsk maur. Norsk ent. Tidsskr. 6, 1943. Kr. 2.—.

A. NIELSEN: Bidrag til Rogalands macrolepidopterfauna, med særlig henblikk på Jæren. Norsk ent. Tidsskr. 10, 1956. Kr. 3.—.

M. OPHEIM: Catalogue of the Lepidoptera of Norway. I. *Rhopalocera, Grypocera, Sphinges* and *Bombyces.* 1958. Kr. 3.—.

M. OPHEIM. Catalogue of the Lepidoptera of Norway. II. Noctuoidea 1962. Kr. 4.—.

A. STRAND: Inndeling av Norge til bruk ved faunistiske oppgaver. Norsk ent. Tidsskr. 6. 1943. Kr. 2.—.

A. STRAND: Konturkart av Sør-Norge (26 × 42 cm) og av Nord-Norge (34 × 42 cm) med inndeling i faunistiske områder. Kr. 0.25 pr. stk.

A. STRAND und A. VIK: Die Genitalorgane der nordischen Arten der Gattung *Atheta* Thoms. Norsk ent. Tidsskr. 12, 1964. Kr. 20.—.

E. SUNDT: Revision of the Fenno-Scandian species of the genus *Acrotrichis* Motsch. Norsk ent. Tidsskr. 10, 1958. Kr. 4.—.

Henvendelse til:

Statsentomolog JAC. FJELDDALEN, Statens plantevern, Vollebekk.