

ON THE GENUS THERIOAPHIS WALKER, 1870, WITH DESCRIPTIONS OF NEW SPECIES (HOMOPTERA, APHIDIDAE)

by

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INTRODUCTION

The second author in 1959 and 1960 collected aphids in the Netherlands, Germany, Switzerland, Austria, Italy, Southeastern France, Israel and Iran, concentrating on Phyllaphidine ("Callipterine") aphids. Many species were reared and used for small experiments. In the Netherlands, Austria, and during the period of 22 August 1959 to 13 September 1959 in Southern France, the first author took part in the aphid hunt. The resulting material was handed to the first author for preliminary identification.

A considerable number of undescribed species was discovered. Rather than merely publish the descriptions we have decided to write a more comprehensive paper. The study of some species, e.g., *Therioaphis ononidis* (Kaltenbach), over their territory gave us an insight into their intraspecific variability and this knowledge could then be applied to such controversial species as *Therioaphis trifolii* (Monell).

THE HISTORY OF THE GENUS THERIOAPHIS WALKER, 1870

F. Walker very briefly described the genus and indicated *Aphis ononidis* Kaltenbach, 1846, as the type. As according to Doncaster (1961), *Aphis ononidis* Kaltenbach is still present among Walker's slides, no confusion about the type is possible. Börner (1949) erected the new genera *Triphyllaphis*, *Pterocallidium* and *Myzocallidium* which will have to be discussed in some detail.

Triphyllaphis Börner, 1949, type *Triphyllaphis luteola* Börner, 1949, is distinguished from the other genera by the presence of pleural hairs in first instar larvae and adults, and the conical shape and absence of notable pigmentation of the hair-bearing processi in apterae. We can confirm the presence of tiny pleural hairs in the embryos and first instar larvae, but these hairs occur not nearly as regularly as Börner suggested, although

always several are present. In this connection the story of "*Chaitophorinus*" *coracinus* Koch, as published in Börner (1952: 322) should be consulted. Quednau (1954) drew the logical conclusion and used the presence of these pleural hairs merely as a specific character. Yet the latter author maintained the genus *Triphyllaphis* Börner on the ground that the hair-bearing processes are hardly pigmented. This character has even less value, as Graham (1959) demonstrated that the pigmentation of these tubercles can strongly vary with temperature, which we can confirm; besides it varies with age. Ossiannilsson (1960) suggested making *Triphyllaphis* Börner a synonym of *Therioaphis* Walker, which we do.

Pterocallidium Börner, 1949, type *Chaitophorus maculatus* Buckton, 1899 (in Quednau, 1954, erroneously *Callipterus trifolii* Monell, 1882), is distinguished because after the first moult the larvae have pleural hairs, and later more hairs, "accessory hairs", whereas in *Therioaphis* Walker in Börner's sense and in *Myzocallidium* Börner not even the adults have pleural hairs. Also Quednau (1954) accepted this genus in his study of first instar larvae, separating *Pterocallidium* from *Therioaphis* by its less hairy and shorter last rostral segment, and separating *Myzocallidium* from his other genera on the basis that the spinal hairs are shorter than the marginal hairs. Again these are useful characters for distinguishing species, but not genera. Therefore *Pterocallidium* too must be sunk as a synonym of *Therioaphis* Walker.

Myzocallidium Börner, 1949, type *Myzocallidium riehmii* Börner, 1949, from *Melilotus* spp. for some time looked rather good as a genus, because all its viviparae are alate, while in the other species then known apterous viviparae are the more common morph. Pintera (1957) described *dorycnii* as a *Myzocallidium* as all its viviparae are alate and for this reason also *Myzocallidium tenerum* Aizenberg was placed in that genus. The absence of apterous viviparous females is, at least in this group of aphids, certainly no good reason for separating genera as our study of *T. alatina* - *T. ononidis* clearly shows (p. 12). Quednau (1954) separated *Myzocallidium* Börner by the difference in length between the spinal and marginal hairs in first instar larvae, a character to which he elsewhere (in *Drepanosiphum* Koch, *Pterocallis* Passerini and *Tuberculatus* Mordvilko) did not give more than interspecific value. All this makes it advisable to follow Ossiannilsson's (1959) suggestion towards making also *Myzocallidium* Börner a synonym of *Therioaphis* Walker.

Ossiannilsson also included *Rhizoberlesia* del Guercio, 1915, type *Rhizoberlesia trifolii* del Guercio, 1915, as a potential synonym of *Therioaphis* Walker. Although undoubtedly *Rhizoberlesia* is closest related to *Therioaphis*,

we prefer to maintain it as a separate subgenus. The somewhat sclerotic tergum in apterae, the almost poriform siphunculi and the entire absence of hair-bearing processi on apterae justify maintaining *Rhizoberlesia* del Guercio as a separate subgenus, very closely related to *Therioaphis* Walker proper.

We incorporate in *Therioaphis* Walker s.s. the following species: 1, *Therioaphis alatina* nov. spec.; 2, *Myzocallidium astragali* Dzhibladze, 1959; 3, *Therioaphis bonjeaniae* nov. spec.; 4, *Therioaphis collina* Börner, 1942; 5, *Myzocallidium dorycnii* Pintera, 1957; 6, *Callipterus genevei* Sanborn, 1904; 7, *Therioaphis litoralis* nov. spec.; 8, *Therioaphis loti* nov. spec.; 9, *Triphyllaphis luteola* Börner, 1949; 10, *Pterocallidium lydiae* Börner, 1949; 10, *Chaitophorus maculatus* Buckton, 1899; 12, *Therioaphis natricis* nov. spec.; 13, *Therioaphis obscura* nov. spec.; 14, *Aphis ononidis* Kaltenbach, 1846; 15, *Pterocallidium propinquum* Börner, 1949; 16, *Myzocallidium riehmii* Börner, 1949; 17, *Therioaphis subalba* Börner, 1949; 18, *Myzocallidium tenerum* Aizenberg, 1956; 19, *Callipterus trifolii* Monell, 1882.

Nos. 4, 6, 10, 11 and 15 are synonyms of *Therioaphis trifolii* (Monell), so that the subgenus has now 14 species.

ACKNOWLEDGEMENTS

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TYPES

The holotypes and most of the paratypes of our new species and subspecies are in the collection of the first author; paratypes of most of these aphids have also been deposited in the Rijksmuseum van Natuurlijke Historie, Leiden, the British Museum (Natural History), London, the U.S. National Museum, Washington (D.C.), and in the collections of Drs. G. Remaudière, Paris and R. C. Dickson, Riverside (Calif.).

Genus **Therioaphis** Walker, 1870

Key to subgenera

- 1 (2) Larvae, except first instar ones, and adults with all dorsal hairs inconspicuous, blunt, much shorter than basal diameter of third

antennal segment, not placed on processi but on rough, convex sclerotic plates; first instar larvae with only the hairs on eighth abdominal tergite elongated. Siphunculi very short, in adults conical with rather rounded flangeless apex

- *Rhizoberlesia* del Guercio, p. 43
- 2 (1) Larvae and adults with at least the marginal hairs, but usually also the spinal hairs elongated, knobbed; the majority much longer than basal diameter of third antennal segment, in later instars placed on conical processi. Siphunculi usually just below apex as narrow as or narrower than at apex *Therioaphis* Walker, p. 6

Subgenus **Therioaphis** Walker, 1870

Key to species

- 1 (22) On abdomen of viviparae never more than four dorsal hairs per segment present: one pair of spinal hairs and one pair of marginal hairs. Also embryos and first instar larvae with only four hairs per abdominal segment.
- 2 (7) Last rostral segment distinctly longer than second joint of hind tarsi, with at least eight hairs besides the three subapical pairs of hairs. On *Ononis* spp.
- 3 (4) Eighth abdominal tergite in viviparae with two spinal hairs only, not or very rarely with a lateral hair. All adult viviparae with smaller or larger wings. Last rostral segment with more than sixteen (usually about twenty to twenty-two) hairs besides the subapical pairs. On yellow-flowering *Ononis* spp. (*O. natrix* L., *O. minutissima* L.). France, Italy, Switzerland
. *T. alatina* nov. spec.
- 4 (3) Eighth abdominal tergite in viviparae with four to six hairs: two spinal ones and two to four smaller marginal to subventral ones. Predominant viviparous morph without wings. Last rostral segment with six to twenty-seven hairs besides the three subapical pairs.
- 5 (6) Last rostral segment with rarely more than twelve hairs besides the three subapical pairs. On pink-flowering *Ononis* spp. (*O. repens* L., *O. spinosa* L., *O. antiquorum* L., *O. leiosperma* Boiss.). Europe, Israel *T. ononidis* Kaltenbach
- 6 (5) Last rostral segment with about fourteen to twenty-seven hairs besides the three subapical pairs. On yellow-flowering *Ononis* sp. (*O. natrix* L.). Israel *T. natrix* nov. spec.
- 7 (2) Last rostral segment usually distinctly shorter than second joint

- of hind tarsi and only very rarely with more than six hairs besides the three subapical pairs. Not on *Ononis* spp.
- 8 (9) Processus terminalis (measured from the distal rim of the primary rhinarium) distinctly shorter than base of sixth antennal segment, less than $1\frac{1}{2}$ times as long as second joint of hind tarsi. Hair-bearing plates on abdomen in alatae dark. No apterous viviparous females present. On *Astragalus* spp. Caucasus, Iran
. *T. astragali* (Dzhibladze)
- 9 (8) Processus terminalis rarely shorter, usually longer than base of sixth antennal segment, and if less than $1\frac{1}{2}$ times as long as second joint of hind tarsi, then hair-bearing plates in alatae rather pale. With or without apterous viviparae.
- 10 (11) Spinal hairs in all embryos, larvae and adults very short from first to fifth abdominal tergites, in embryos only 0.013 mm, in adults up to 0.026 mm. In embryos and first instar larvae marginal hairs about twice as long as spinal hairs. All viviparae alate. On *Melilotus* spp. Europe, Asia, North America . . . *T. riehmi* (Börner)
- 11 (10) Spinal hairs in all embryos and adults at least on first abdominal tergite considerably longer, at least 0.035 mm long. In embryos and first instar larvae marginal hairs hardly longer than spinal hairs. Viviparae sometimes mostly apterous.
- 12 (17) Most viviparae apterous, though alatae are usually not rare.
- 13 (14) Abdomen in apterae with very large, paired or partly fused sclerotic bars on each of first to seventh segments; spinal hairs on third, fifth and seventh segments on large conical processi in the center of such bars, but those on first, second, fourth and sixth segments placed at the inner ends of such bars. Alatae usually with conspicuous ventral sclerotisation on abdomen consisting of dusky bars or fragments of bars. On *Dorycnium suffruticosum* Vill. Mediterranean France, Italy, Spain
. *T. obscura* nov. spec.
- 14 (13) Abdomen in apterae without sclerotic bars, and if the hair-bearing processi are placed on sclerotic plates then they are all placed more or less in the center of such plates. Alatae without conspicuous ventral sclerotisation.
- 15 (16) Marginal hair-bearing processi on second abdominal tergite in apterae with a black spot, the other processi vaguely pigmented. Rhinaria in apterae and alatae usually over more than half the length of third antennal segment. On *Trifolium medium* L. and *T. alpestre* L. Sweden, Germany, Austria. (Rare specimens of)

- *T. subalba* Börner
- 16 (15) All dorsal processi in apterae similarly smoky. Rhinaria in apterae and alatae on basal half of third antennal segment. On *Lotus allionii* Desv. and *Bonjeania hirsuta* Rchb. Mediterranean area of France *T. litoralis* nov. spec.
- 17 (12) All viviparae alate.
- 18 (19) Knob of cauda distinctly longer than its largest width. Eighth abdominal tergite with two to four marginal hairs on dark or not pigmented sclerites besides the two much larger spinal hairs. On *Dorycnium pentaphyllum* Scop. Czechoslovakia *T. dorycni* (Pintera)
- 19 (18) Knob of cauda not longer, usually shorter than its largest width. Eighth abdominal tergite only with two stout spinal hairs.
- 20 (21) Processus terminalis $1\frac{1}{3}$ to $1\frac{3}{5}$ times as long as second joint of hind tarsi. Sixth antennal segment usually shorter than fifth antennal segment. On *Caragana arborescens* Lam. Russia *T. tenera* (Aizenberg)
- 21 (20) Processus terminalis twice or very nearly twice as long as second joint of hind tarsi. Sixth antennal segment as long as or longer than fifth antennal segment. On *Lotus peregrinus* Boiss. Israel *T. loti* nov. spec.
- 22 (1) On abdomen of viviparae at least on some of the tergites more than four hairs per segment present, especially in apterae. Embryos and first instar larvae with four or six hairs per abdominal segment. Apterous viviparae present.
- 23 (24) Usually first to fourth abdominal segments with four long hairs on large processi (two spinal hairs, two marginal hairs), supplemented by one to many smaller to very much smaller pleural hairs placed on processi very much smaller than those bearing the nearest spinal hairs. Embryos or first instar larvae with spinal and marginal hairs, not with very much smaller pleural hairs. On *Trifolium medium* L. and possibly *T. alpestre* L. Sweden, Germany, Austria *T. subalba* Börner
- 24 (23) The majority of first to fourth abdominal segments with at least six hairs, usually of the same length and usually on processi of very nearly equal size, often some with more, and rarely a segment with only four hairs. Embryos or first instar larvae sometimes with very small pleural hairs.
- 25 (26) Processus terminalis distinctly shorter than base of sixth antennal segment, only about as long as second joint of hind tarsi. Siphun-

- culi very small and inconspicuous, only about 0.02 to 0.03 mm long. On *Bonjeania recta* Rchb. Southern France
 *T. bonjeaniae* nov. spec.
- 26 (25) Processus terminalis rarely shorter, often longer, than base of sixth antennal segment, considerably longer than second joint of hind tarsi. Siphunculi pigmented, distinctly visible, about 0.04 to 0.07 mm long.
- 27 (28) Abdominal dorsum rather regularly with six longitudinal rows of hairs on first to fourth tergites, sometimes with some pleural hairs missing. Mammiform processi or plates with hairs on abdomen rather pale in apterae, not with dark borders. Embryos or first instar larvae on first to fourth abdominal tergites with six hairs per segment of which the pleural ones are mostly small and frequently partly absent. On *Trifolium pratense* L. Germany, Netherlands, Austria, England, etc. *T. luteola* (Börner)
- 28 (27) Several of first to fourth abdominal tergites with more than six hairs and the hairs often irregularly arranged. Mammiform processi or sclerotic plates bearing hairs in apterae usually considerably pigmented or with dark borders. On various genera of Papilionaceae (*Trifolium*, *Medicago*, *Astragalus*, *Ononis*, *Lotus*, etc.). Europe, Asia, Africa, North America
 *T. trifolii* (Monell) sensu latiore
- a (b) In apterae large, blackish submarginal sclerites ventrally present on most of the abdominal segments. Dorsal hair-bearing sclerites blackish, the pleural ones only about one-third of the size of the marginal ones. In cleared specimens the legs about as pale as the eyes. On *Astragalus onobrychis* L. Austria *T. trifolii* subsp. 1)
- b (a) In apterae sometimes submarginal sclerites ventrally present, but these sclerites small, narrow and rather pale smoky. Dorsal sclerites rarely blackish, usually with a pale center, but if they are blackish, then the legs in cleared specimens considerably darker than the eyes.
- c (d) Spinal hairs in apterae viviparae on third abdominal tergite shorter than, rarely as long as, 0.060 mm, only about three to five times as long as their largest (subapical) thickness. On *Astragalus* spp. France

1) Prof. Dr. F. P. Müller, Rostock, Germany, kindly let us examine material of a sample which he recognized as undescribed, collected by Prof. H. Franz, Vienna. He will describe this material later.

- subspec. *brevipilosa* nov. subspec.
 d (c) Spinal hairs, at least the longest, in apterae viviparae on
 third abdominal tergite longer than 0.060 mm, more slender.
 On various other Leguminosae . subspec. *trifolii* (Monell)

Descriptive notes on the species

Therioaphis alatina nov. spec.

Alate viviparous female.

Morphological characters. — Body about 1.30 to 2.20 mm long. Head rather pale, with the very front, a band on the underside connecting the anterior margins of the compound eyes, low, roundish tubercles bearing cephalic hairs and a small median area on the posterior part of vertex more or less brown pigmented. Thorax brownish. Abdomen with the mammiform hair-bearing processi blackish brown and these processi placed on medium-sized dark plates with paler centers; dorsally linear, dark intersegmental sclerites present or absent; ventrally usually narrow dark sclerites present, especially marginally, but these sclerites sometimes fused into more or less continuous, not strongly pigmented thin bars. Pleural hairs, and often a number of small spino-pleural hairs usually present on mesonotum, but abdomen with spinal and marginal hairs only; spinal hairs on third, fifth and eighth segments at greater mutual distances than those of the other segments. Eighth abdominal tergite with only two hairs that are considerably smaller than spinal hairs of third tergite, about 0.025 to 0.035 mm long, on very small processi. All dorsal hairs darkish, the spinal ones of third abdominal tergite about 0.026 to 0.069 mm long, and the mammiform processi bearing them equally variable in height; marginal hairs very much shorter. Antennae dusky with the apex and the apices of third and fourth segments darker, $\frac{6}{7}$ to $1\frac{1}{10}$ times length of body; third segment with 6 to 19 (mostly more than 10) rhinaria, distributed over basal $\frac{1}{2}$ to $\frac{4}{5}$ part of the segment. Processus terminalis distinctly longer than base of sixth segment, about $1\frac{6}{7}$ to 2 times second joint of hind tarsi. Hairs on third antennal segment short, only about $\frac{2}{5}$ of diameter of that segment at its constricted base. Rostrum reaching to just past the middle coxae; last segment considerably, to $\frac{2}{5}$, longer than second joint of hind tarsi, with some 17 to 25 hairs besides the three subapical pairs. Siphunculi as dark as the marginal processi, placed on slightly paler sclerites. Cauda rather pale, with the knob about 0.09 mm wide and equally long, with two hairs on apex and nine to twelve hairs on the underside. Legs brownish, with the bases of the tibiae darker, especially those of the hind tibiae; tibiae rather densely hairy; first tarsal joints with two dorsal hairs, five ventral hairs along distal margin and

usually one ventral hair more basad. Wings with normal *Therioaphis* venation, but the veins broadly bordered with brown and this border distad widening and deeper brown to blackish; development of wings highly variable.

Colour. — As in *Therioaphis ononidis* (Kaltenbach) ground colour pale dirty greenish yellow, with brown stripes on head and thorax and dark brown markings on abdomen. Legs dusky.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	2.17	2.08	0.07	0.22	0.69	0.44	0.37	0.17 + 0.24	15 & 19
2	1.95	1.94	0.07	0.22	0.65	0.40	0.34	0.16 + 0.21	12 & 15
3	1.93	1.94	0.09	0.21	0.66	0.39	0.35	0.17 + 0.21	12 & 18
4	1.84	1.74	0.09	0.20	0.58	0.37	0.31	0.14 + 0.20	16 & 18
5	1.72	1.69	0.07	0.20	0.57	0.31	0.28	0.14 + 0.19	11 & 11
6	1.71	1.64	0.09	0.19	0.56	0.30	0.28	0.13 + 0.20	9 & 10
7	1.87	1.49	0.06	0.19	0.52	0.29	0.24	0.13 + 0.17	6 & 7
8	1.99	1.67	0.07	0.21	0.61	0.35	0.28	0.13 + 0.16	10 & 13
9	2.08	1.91	0.07	0.22	0.66	0.38	0.33	0.16 + 0.22	13 & 13
10	2.15	1.83	0.09	0.20	0.63	0.38	0.32	0.15 + 0.19	10 & 10
11	1.54	1.58	0.06	0.17	0.56	0.31	0.27	0.13 + 0.18	17 & 18
12	1.51	1.56	0.05	0.17	0.55	0.29	0.26	0.14 + 0.19	17 & 17
13	1.42	1.44	0.05	0.19	0.51	0.27	0.23	0.13 + 0.17	15 & 17
14	1.74	1.54	0.06	0.19	0.58	0.31	0.24	0.12 + 0.17	17 & 17
15	1.53	1.68	0.06	0.17	0.56	0.34	0.28	0.15 + 0.21	17 & 18
16	1.68	1.77	0.06	0.18	0.58	0.35	0.31	0.16 + 0.21	17 & 17
17	2.07	1.97	0.07	0.20	0.70	0.40	0.35	0.15 + 0.20	10 & 11

1-2, from *Ononis natrix* L., 10 km N. of Nice Airport, dépt. Alpes Maritimes, France, 28 May 1956; 3 (holotype)-4, as no. 1, but 11 June 1959; 5-6, from *Ononis natrix*, 5 km S.E. of Oraison, dépt. Basses Alpes, 4 September 1959; 7-8, from *Ononis natrix*, 5 km E. of Valensole, dépt. Basses Alpes, 4 September 1959; 9-10, from *Ononis natrix*, 8 km N.W. of Valensole, dépt. Basses Alpes, 9 October 1959; 11-12, from *Ononis minutissima* L., 5 km W. of Valensole, dépt. Basses Alpes, 5 September 1959; 13-14, from *Ononis minutissima*, Lurs, dépt. Basses Alpes, 10 September 1959; 15-16, from *Ononis minutissima*, Cap d'Antibes, dépt. Alpes Maritimes, 22 October 1959; 17, from *Ononis natrix*, Zeneggen (1450 m), Canton Wallis, Switzerland, 11 July 1952, leg. R. Stäger.

Oviparous female.

Morphological characters. — Front of head darkish and also vertex with dark areas or nearly wholly dark, like pronotum. Dorsal hairs on meso- and metanotum and abdomen on quite large dark mammiform processi which spinally on first abdominal tergite are about 0.060 mm high, but smaller more caudad; these processi on second to sixth segments spinally on smaller or larger darkish sclerotic plates; spinal hairs on third, fifth and seventh ab-

dominal segments at markedly greater mutual distances than the other spinal hairs; eighth tergite with two stout knobbed hairs that are considerably shorter than those on third tergite, and with some eight to twelve smaller, blunt to acute hairs. Linear, dotted intersegmental sclerites present on abdomen. Antennae darkish, shorter than body, third segment with six to twelve rhinaria over basal $\frac{3}{7}$ to $\frac{5}{8}$ part; processus terminalis longer than base of sixth segment. Rostrum as in alate females. Siphunculi not on a sclerotic plate, smaller than in alate females. Cauda much shorter with shorter knob. Subanal plate entire, rounded. Hind tibiae at the very base darker brown than in the other tibiae, swollen to nearly twice the thickness in the middle of the other tibiae, with some 50 to 75 roundish pseudosensoria.

Colour. — Not noted.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.94	1.64	0.06	0.12	0.57	0.31	0.27	0.15 + 0.19	9 & 10
2	1.96	1.52	0.06	0.14	0.53	0.28	0.26	0.13 + 0.18	11 & 12
3	2.19	1.68	0.06	0.12	0.62	0.30	0.29	0.16 + 0.17	11 & 11
4	2.02	1.61	0.06	0.14	0.54	0.31	0.27	0.14 + 0.20	12 & 12
5	2.09	1.68	0.06	0.13	0.58	0.32	0.29	0.16 + 0.17	7 & 8
6	1.96	1.53	0.06	0.12	0.53	0.30	0.26	0.14 + 0.16	6 & 7

1-6, from *Ononis natrix* L., 8 km N.W. of Valensole, dépt. Basses Alpes, France, 9 October 1959, with alatae no. 9 and 10.

Larvae.

First instar larvae with dorsal hairs on dark sclerotic plates, with only spinal and marginal hairs present; on third, fifth and seventh abdominal segments the spinal hairs at unusually large mutual distances; spinal hairs on third abdominal tergite about 0.060 mm long. Last rostral segment with (18) to 22 hairs.

Notes. — When Dr. R. Stäger in 1952 sent only alatae and alatoid nymphs of *Therioaphis* from *Ononis natrix* L., this material was identified with *T. ononidis* Kaltenbach. When more samples with only alatae and alatoid nymphs from *Ononis natrix* were available, and at the same time and in the same area samples consisting mainly of apterae were taken on *Ononis spinosa* L., we began a thorough survey in Europe. It appeared that throughout the area of investigation all available yellow-flowering *Ononis*, viz. *O. natrix* L. and *O. minutissima* L., did not have apterous viviparous females — only alatae and later oviparae — while pink-flowering *Ononis*, viz. *O. repens* L., *O. spinosa* L., and *O. antiquorum* L., had mainly apterae viviparae

and only in summer many, later fewer, alate females. In a few cases bushes of yellow and pink *Ononis* grew with their branches intertwined. Yet the one would have only alatae, the other nearly only apterous viviparae. After a rather long morphological study, small but constant morphological differences were discovered between the alatae plus oviparae from yellow-flowering *Ononis* and those from pink-flowering *Ononis*.

In viviparous *T. ononidis* from pink-flowering *Ononis* the last rostral segment has fewer hairs, the eighth abdominal tergite has usually four, sometimes three and exceptionally two hairs, of which the spinal pair is somewhat thinner but not much shorter than the spinal hairs on the third abdominal tergite. In viviparous *T. alatina* the last rostral segment has many more hairs, especially on its ventral surface, and the eighth abdominal tergite has normally two hairs which are much shorter and thinner than the spinal hairs of the third abdominal tergite. The number and distribution of rhinaria shows wider variation than usual, but nothing points to the presence of more than one taxon.

All viviparae of this species that we could find had wings, but in the majority of specimens the wings are so small that the insects could not fly with them. So one finds specimens with normally veined fore wings that are shorter than the width of the mesothorax. There is a fairly distinct correlation between wing size and size of body. Full sized specimens mostly have usable wings, small specimens strongly reduced wings. One wonders why viviparous specimens that are really apterous were not encountered among thousands of specimens although true apterae exist as oviparae.

This kind of "brachyptery" is not rare in *T. ononidis* either, and it also is found in other members of the genus, in *Myzocallis myrica* (Kaltenbach), etc.

The occurrence of three species, two with and the third without apterae viviparae on *Ononis*, species that are alike to the highest degree, demonstrates that the absence or occurrence of apterae viviparae in this group of aphids should not be used for generic classification.

Types. — Holotype: alate (slightly brachypterous) female from *Ononis natrix* L., 10 km N. of Nice Airport, dépt. Alpes Maritimes, France, 11 June 1959, in the collection of D. Hille Ris Lambers. Paratypes: from *Ononis natrix* L.: 2 alate viviparous females, 10 km N. of Nice Airport, dépt. Alpes Maritimes, 28 May 1959; 40 alate viviparous females, same locality, 11 June 1959; 6 alate viviparous females, 5 km S.E. of Oraison, dépt. Basses Alpes, 4 September 1959; 10 alate viviparous females, 5 km E. of Valensole, dépt. Basses Alpes, 4 September 1959; 8 alate viviparous females and 29 oviparous females, 8 km N.W. of Valensole, dépt. Basses Alpes, 9 October 1959; from

Ononis minutissima L.: 35 alate viviparous females, 5 km W. of Valensole, dépt. Basses Alpes, 5 September 1959; 37 alate viviparous females, Lurs, dépt. Basses Alpes, 10 September 1959; 15 alate viviparous females, Cap d'Antibes, dépt. Alpes Maritimes, 22 October 1959.

Further material: from *Ononis natrix* L., Zeneggen (1450 m), canton Wallis, Switzerland, 11 July 1952; leg. Dr. R. Stäger.

Therioaphis astragali (Dzhibladze, 1959)

Dr. Dzhibladze most kindly provided us with topotypical material of this species consisting of alatae and sexuales from *Astragalus caucasicus* Pall. Specimens collected by the second author on *Astragalus* sp., 60 km N.W. of Chazvin in Iran on 1 June 1960, clearly belong to the same species.

The embryos inside alatae have on third abdominal tergite spinal and also marginal hairs of 0.059 mm.

Alatae have variable hairlengths as usual. Sometimes the hairs are on the anterior abdominal tergites quite long (0.069 mm), but always short (0.020 mm) on more posterior tergites; sometimes only a few hairs on the anterior abdominal tergite are long or even all hairs may be quite short. The hairs stand on blackish pigmented processi and these are placed on mostly very large sclerotic plates which on third, fourth and fifth tergites tend to coalesce to transverse bars, especially in material from Iran. These sclerites are quite pale with a dusky to brownish border and if they are sometimes not at all pigmented they seem to be absent. The last rostral segment is sometimes hardly shorter than the second joint of the hind tarsi and up to eight hairs besides the three apical pairs are present in some specimens.

Oviparae have the plates on which the hair-bearing processi are placed at most twice as large as these processi and both are brown, not blackish. The hairs on third abdominal tergite measure about 0.100 mm. Only the spinal hairs on fifth and seventh tergites stand at greater mutual distances. Also in males the dorsal sclerites are small, like the hair-bearing processi.

Characters distinguishing this aphid from related species are indicated in the key.

Therioaphis bonjeaniae nov. spec.

Apterous viviparous female.

Morphological characters. — Body about 1.50 to 1.75 mm long. Tergum usually completely pigmentless, more rarely, especially in late autumn, with the processi on which the dorsal hairs are placed, slightly tinged; not visibly sclerotized. Dorsal hairs on first to fourth abdominal tergites present in six to eight longitudinal rows, placed on mammiform processi that usually are

distinctly scabrous or spinulose. Spinal and marginal hairs of third abdominal tergite 0.052 to 0.065 mm long, on processi of about 0.035 mm high; pleural hairs smaller, about 0.034 to 0.050 mm long, thinner and on considerably smaller processi; between the pleural and spinal hairs often much smaller hairs of about 0.022 mm, placed on hardly developed processi; eighth tergite with two long spinal hairs of about 0.069 mm, and two small lateral hairs of about 0.022 mm; the spinal hairs on seventh tergite show a considerably greater mutual distance than the other spinal pairs. Antennae $\frac{6}{7}$ to $\frac{13}{14}$ of length of body, pale, slightly brownish at the apices of third and fourth segments and with brownish apex. Third segment with 8 to 14 strongly transverse, rather small rhinaria in a row over $\frac{2}{3}$ to $\frac{5}{6}$ part of the segment; processus terminalis shorter than base of sixth segment, about as long as second joint of hind tarsi. Hairs on third segment acute, adpressed, nearly half as long as basal diameter of the segment. Rostrum reaching to middle coxae, pale with only the tip of last segment dark; last segment short, $\frac{2}{3}$ of second joint of hind tarsi. Siphunculi easily overlooked, very small, colourless, about 0.030 mm wide in the middle, and about 0.020 to 0.025 mm long. Cauda pale with a large, egg-shaped knob of about 0.11 mm long and 0.09 mm wide, at apex with two stout hairs, ventrally with 14 to 16 shorter hairs; subanal plate deeply bilobed. Legs including the tarsi pale; first tarsal joints with two dorsal hairs, four long and one short ventral hairs along distal margin and often one more ventral hair more basad.

Colour. — In life evenly whitish to somewhat yellowish.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.63	1.48	0.02	0.17	0.48	0.27	0.28	0.18 + 0.15	11 & 12
2	1.49	1.38	0.02	0.21	0.45	0.24	0.26	0.17 + 0.13	9 & 13
3	1.65	1.34	0.02	0.21	0.43	0.22	0.27	0.17 + 0.13	9 & 9
4	1.58	1.43	0.02	0.20	0.50	0.23	0.28	0.16 + 0.13	10 & 10
5	1.65	1.43	0.02	0.20	0.45	0.28	0.27	0.18 + 0.14	10 & 10
6	1.63	1.48	0.02	0.20	0.51	0.28	0.27	0.17 + 0.13	11 & 12
7	1.70	1.46	0.02	0.20	0.49	0.24	0.29	0.18 + 0.13	7 & 12
8	1.72	1.61	0.02	0.22	0.53	0.31	0.32	0.19 + 0.13	11 & 13
9	1.72	1.51	0.02	0.22	0.50	0.28	0.29	0.18 + 0.13	9 & 11
10	1.68	1.47	0.02	0.21	0.48	0.29	0.28	0.17 + 0.13	12 & 13

All from *Bonjeania recta* Rchb.; 1 (holotype), 10 km N. of Nice Airport, dépt. Alpes Maritimes, France, 26 August 1959; 2 as no. 1, but 1 September 1959; 3-5, as no. 1, but 7 September 1959; 6-7, 7 km N.E. of Oraison, dépt. Basses Alpes, 10 September 1959; 8, 2 km W. of Dibiasse, dépt. Basses Alpes; 9-10, as no. 8, but 9 October 1959.

Alate viviparous female.

Morphological characters. — Much like apterous viviparous female. Head

faintly pigmented with on the underside a brownish bar connecting the anterior margin of the compound eyes; thorax faintly smoky; abdomen with the processi on which the dorsal hairs are placed, and also often the sclerites on which a processus stands dark brownish to blackish pigmented; marginal processi not on a sclerite and usually only orad or caudad pigmented, with the ones on first, sixth and eighth segments paler brown than the others; the sclerites at the bases of the hair-bearing processi paler than the processi, sometimes with slightly darker margins, usually on first to fifth tergites wholly or partly fused to bars that are broken in the middle and that have on each half two to four hairs, of which the two stout spinal and pleural hairs are as in apterae, but rather distinctly pigmented. Antennae as in apterae shorter than body, with the basal segments pale like the head, but the flagellum, especially towards apex and at the apices of the segments brown to blackish brown; rhinaria as in apterae, 9 to 16 in number. Siphunculi as colourless and inconspicuous as in apterae, seemingly absent. Legs pale with the tibiae towards apex faintly brownish. Wings with the normal *Therioaphis* venation and pigmentation.

Colour. — In life pale yellowish with rows of black dots on abdomen.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.68	1.50	0.03	0.19	0.47	0.29	0.31	0.19 + 0.13	11 & 14
2	1.66	1.56	0.03	0.20	0.51	0.30	0.31	0.19 + 0.13	9 & 12
3	1.94	1.70	0.03	0.23	0.56	0.32	0.33	0.20 + 0.15	12 & 13
4	1.90	1.65	0.03	0.22	0.53	0.33	0.33	0.18 + 0.14	11 & 15
5	1.80	1.68	0.03	0.21	0.57	0.33	0.32	0.18 + 0.13	13 & 14

All from *Bonjeania recta* Rchb.; 1, 10 km N. of Nice Airport, dépt. Alpes Maritimes, France, 7 September 1959; 2-5, 2 km W. of Dibiasse, dépt. Basses Alpes, 9 October 1959.

Larvae.

First instar larvae not pigmented, with on thorax and abdomen only spinal and marginal hairs, the spinal ones on third segment 0.026-0.039 mm long. Antennae of four segments: third about 0.195 mm, fourth about (0.078 + 0.052) mm. Last rostral segment short, with eight to ten hairs.

Notes. — In the end of August a few specimens were after hours of searching taken from the undersides of leaflets of *Bonjeania recta* Rchb. growing over a ditch parallel and next to the river Var. During repeated visits a few more were collected, but then great quantities were found on *Bonjeania recta* growing in roadside ditches in the Oraison area, where until

the beginning of November the species was abundant. In other localities the quite common plant proved to have no aphids.

Alatae were found rather sparingly in the autumn, but although most aphids, also *Therioaphis* spp., produced sexuales in the area, the present species went on reproducing exclusively viviparously until November when the observations were ended.

Apterae viviparae can easily be identified by their hair-pattern, the area covered by the rhinaria and the short processus terminalis which is only as long as the second joint of the hind tarsi. Alatae stand out by their numerous hairs with the broken dark bars on the abdomen, in combination with the characters mentioned for apterae.

Types. — Holotype: apterous viviparous female, from *Bonjeania recta* Rechb., 10 km N. of Nice Airport, dépt. Alpes Maritimes, France, 26 August 1959, leg. R. van den Bosch and D. Hille Ris Lambers, in the collection of the latter. Paratypes: 13 alate viviparous females and 180 apterous viviparous females from the same locality as the holotype, and from the Oraison area, dépt. Basses Alpes, at various dates between 1 September 1959 and 1 November 1959.

***Therioaphis dorycnii* (Pintera, 1957)**

Through the kindness of Dr. Pintera cotypical alate viviparae and an ovipara from *Dorycnium pentaphyllum* Scop. were made available. During a visit to the type locality near Mohelno with Drs. Pintera and Holman the first author on 2 September 1960 found a considerable number of alatae and nymphs and one ovipara, but, as Pintera mentioned, apterae viviparae did not occur.

As pointed out under *T. obscura* nov. spec. on p. 26, *T. dorycnii* is nearly related to *T. obscura* and the only really significant specific difference is the presence of two to three additional, marginal, hairs on the eighth abdominal tergite in viviparous *T. dorycnii*. The ventral sclerotisation, usually quite conspicuous in alate *T. obscura*, is not developed in any viviparous *T. dorycnii* available, but as we also demonstrated under *T. trifolii* (Monell) this is a variable character, and not reliable for specific distinction.

As in most *Therioaphis* the marginal processi on the third abdominal segment are considerably paler than those on second or fourth tergites. At most they have the tip dark while those of neighbouring segments are largely dark. The last rostral is somewhat rostrate and short, just over $\frac{2}{3}$ of the second joint of the hind tarsi.

In embryos spinal and marginal hairs are of similar length and only the

absence of apterae viviparae lead Dr. Pintera to describing the species in *Myzocallidium* Börner.

***Therioaphis litoralis* nov. spec.**

Apterous viviparous female.

Morphological characters. — Body about 1.40 to 1.70 mm long. Tergum in mature specimens with the processi on which the dorsal hairs stand more or less pigmented, and also the sclerites carrying such processi (which themselves often seem to be confluent with the processi) slightly tinged, with darker peripheries. Dorsal hairs placed in four longitudinal rows, the pleural ones absent; the spinal hairs of third and fifth segments only little farther apart than the spinal hairs of fourth and sixth segments, but those of seventh segment with considerably greater mutual distance. Spinal and marginal hairs on third abdominal tergite about 0.080 to 0.090 mm long, placed on smooth, mammiform processi which including their basal sclerite are about 0.060 mm high. Marginal hairs of fifth to seventh segments very much smaller, about 0.035 to 0.045 mm long, on small processi; eighth tergite with two hairs. Head pale, on the underside not with a pigmented bar connecting the antennal bases, on the underside the area between compound eyes and antennal bases somewhat pigmented. Antenna more rarely equal to, but usually longer than body, dusky with basal half of first segment paler, gradually darker towards apex, on distal half distinctly spinulosely imbricated; third segment on basal $\frac{4}{9}$ to $\frac{15}{29}$ with five to eleven transversely oval rhinaria; the part bearing the rhinaria distinctly thicker than the distal part, but gradually thinner towards the part without rhinaria; processus terminalis usually longer than basal part of sixth segment, about $1\frac{2}{3}$ times second joint of hind tarsi. Hairs on third segment short, adpressed, only $\frac{1}{3}$ to $\frac{2}{5}$ of diameter of the segment at its constricted base. Rostrum reaching to the middle coxae; last segment rather short, acute with convex sides, about $\frac{4}{5}$ of second joint of hind tarsi, with ten hairs. Siphunculi pigmented like the hair-bearing sclerites, with just darker apex, easily visible, in the middle about 0.04 mm wide, without flange. Cauda slightly dusky, with a knob of about 0.078 mm long and 0.080 mm wide, with at apex two long hairs and ventrally about eight to eleven shorter hairs. Legs somewhat brownish yellow with the tibiae darkest basally; first tarsal joints with two dorsal hairs, four long and on short hair ventrally along distal margin and often one hair ventrally, more basad.

Colour. — In life rather bright yellowish to ochreous yellow with the hair-bearing processi and sclerites hardly visible, grey pigmented, or in the ochreous ones visible as distinct pale spots.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.55	1.74	0.05	0.15	0.55	0.33	0.33	0.17 + 0.21	8 & 9
2	1.60	1.74	0.05	0.16	0.53	0.37	0.34	0.17 + 0.19	6 & 8
3	1.57	1.82	0.05	0.18	0.58	0.37	0.32	0.18 + 0.22	7 & 8
4	1.68	1.84	0.05	0.18	0.60	0.36	0.32	0.18 + 0.22	7 & 8
5	1.67	1.81	0.05	0.18	0.57	0.37	0.34	0.18 + 0.20	7 & 11
6	1.64	1.71	0.05	0.17	0.55	0.34	0.31	0.17 + 0.20	8 & 9
7	1.45	1.55	0.05	0.16	0.52	0.31	0.28	0.15 + 0.17	5 & 7
8	1.64	1.64	0.05	0.17	0.55	0.32	0.29	0.17 + 0.17	8 & 8
9	1.56	1.79	0.05	0.18	0.57	0.37	0.33	0.17 + 0.21	6 & 7
10	1.60	1.65	0.05	0.18	0.54	0.33	0.29	0.16 + 0.19	6 & 7

1-2, Cap d'Antibes, dépt. Alpes Maritimes, France, 26 May 1959; 3-6, idem, 7 June 1959; 7 (holotype), idem, 9 August 1959; 8, idem, 26 August 1959; 9-10, idem, 29 October 1959; 1-7, from *Lotus allionii* Desv.; 8-10 from *Bonjeania hirsuta* Rchb.

Alate viviparous female.

Morphological characters. — Much like apterous viviparous female, but the pigmented bar on the underside of the head distinct. As to development of hairs, mammiform processi and supporting sclerites, two different forms of alatae occur. In one type the mammiform processi of at least first to fourth abdominal tergites are as in apterae large and with a surrounding darkly bordered pale sclerite, supporting long hairs, while the marginal and remaining spinal hairs are short, 0.016 to 0.030 mm, and are placed on small processi without surrounding plate; in the other more common type the processi on first and second tergites are rather well developed, the others are small, dark and rough; the anterior ones bear hairs of about 0.043 mm, the rest hairs of about 0.013 to 0.016 mm and supporting, dark rimmed sclerites may be present or absent. In all alatae the marginal processi of second abdominal segment are very black and rough, invariably much darker than any other; the ones on third are pale, those on fourth partly dark. Antennae longer than body; third segment with seven to twelve rhinaria on basal half. Wings with the normal *Therioaphis* venation and pigmentation.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.86	2.02	0.05	0.20	0.65	0.43	0.38	0.19 + 0.21	10 & 10
2	1.90	1.91	0.05	0.19	0.63	0.39	0.34	0.18 + 0.21	9 & 10
3	1.66	1.89	0.05	0.18	0.61	0.37	0.35	0.19 + 0.21	10 & 10
4	1.67	1.78	0.05	0.18	0.59	0.35	0.32	0.18 + 0.20	7 & 9
5	1.56	1.87	0.05	0.16	0.54	0.34	0.32	0.18 + 0.19	8 & 11

1, Cap d'Antibes, dépt. Alpes Maritimes, France, 26 May 1959; 2-3, idem, 7 June 1959; 4, idem, 9 August 1959; 5, idem, 26 August 1959; 1, 2 and 4 from *Lotus allionii* Desv., 3 and 5 from *Bonjeania hirsuta* Rchb.

Colour. — “Second” type of alatae rather bright yellow with the hair-bearing processi dark to black. The bases of the hind tibiae darkish.

Oviparous female.

Morphological characters. — Very much like apterous viviparous female, but last few abdominal segments somewhat extracted into an ovipositor-like structure. Eighth abdominal tergite with four thin, small, acute hairs besides the spinal pair of very long knobbed hairs. Hind tibiae on basal half darkened and swollen to about $1\frac{3}{4}$ times the width of the middle tibiae, with on the swollen part some 50 rather large pseudosensoria.

Colour. — Not noted.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.69	1.66	0.05	0.14	0.53	0.31	0.32	0.17 + 0.19	8 & 9

From *Bonjeania hirsuta* Rchb., Cap d'Antibes, dépt. Alpes Maritimes, France, 29 October 1959.

Larvae.

First instar larva with dorsal hairs on dusky plates, with only spinal and marginal hairs present; on third, fifth and seventh abdominal segments the spinal hairs at unusually great mutual distances; spinal hairs on third tergite 0.039 mm long. Last rostral segment with eight hairs.

Notes. — From the end of May till the end of October this aphid was present in considerable numbers on both *Bonjeania hirsuta* Rchb. and *Lotus allionii* Desv. near the Mediterranean shore, but also more inland on *Bonjeania*, which occurs far from the coast. *Lotus allionii*, which certainly is quite acceptable as a host plant, was found infested where *Bonjeania* grew nearby.

Throughout the time of observation alatae were quite common. Not until two years after the collections were made it was noticed that two kinds of alatae were taken, specimens with an abdominal chaetotaxy resembling that of apterae, and specimens with short hairs and small hair-bearing processi. It appears that most of the “apteriform” alatae were taken in early summer and late autumn, very few in August when the majority were short-haired alatae.

In the October material one ovipara was found but most probably hibernation by viviparae is the common way.

In morphology the species resembles several other members of the genus. In general aspect *T. subalba* Börner is the most similar, but the constant

absence of any but the spinal and marginal hairs, and the absence of even a trace of more pronounced pigmentation of any of the marginal processi on the abdomen serve to distinguish apterae very easily. Alate *T. subalba* differ by the black marginal processi and the greater part of third antennal segment that is covered by rhinaria.

Real difficulties are encountered when *T. loti* nov. spec. and *T. litoralis* nov. spec. are compared. Of *T. loti* no apterae are known, only alatae. In extreme "apteriform" alatae of *T. litoralis* the spinal hairs on seventh and eighth tergites are about 0.030 to 0.039 mm long, but then the spinal processi of the anterior tergites are nearly three times as large as those in *T. loti*. And in typical short haired alatae of *T. litoralis* the mentioned hairs are 0.013 to 0.022 mm long, against 0.026 to 0.035 in alate *T. loti*. The processus terminalis is about twice the length of second joint of hind tarsi in *T. loti*, but only $1\frac{2}{3}$ times in *T. litoralis*. First instar larvae and embryos of *T. loti* have the spinal hairs of third abdominal tergite about 20 % longer than those of *T. litoralis*.

Types. — Holotype: apterous viviparous female, from *Lotus allionii* Desv., Cap d'Antibes, dépt. Alpes Maritimes, France, 9 August 1959, in the collection of D. Hille Ris Lambers. Paratypes: 99 apterous viviparous females and 57 alate viviparous females, from 5 km N.E. of Vallauris, dépt. Alpes Maritimes, and from Cap d'Antibes at various dates from 25 May 1959 till 29 October 1959.

***Therioaphis loti* nov. spec.**

Alate viviparous female.

Morphological characters. — Body about 1.45 to 1.70 mm long. Tergum very little pigmented, with the customary band connecting the anterior margins of the compound eyes on the underside of the head not visible so that both head and thorax are almost colourless; on abdomen the marginal tubercles of second segment dark; those of fourth segment, and to a lesser extent the processi or plates that bear spinal hairs, brownish. Dorsal hairs on abdomen in four longitudinal rows, pleural hairs absent; spinal hairs placed on mammiform processi which decrease in size caudad; spinal hairs from 0.030 to 0.043 mm long, those on third, fifth and seventh tergites at distinctly greater mutual distance than the others; eighth tergite with two hairs. Antennae conspicuously thin, pallid with faintly brownish apex, considerably longer than body; third segment from near base gradually thinner towards apex, on basal $\frac{1}{2}$ to $\frac{5}{9}$ with 9 to 14 rhinaria; processus terminalis mostly just longer than base of sixth segment, almost exactly twice as long as second joint of hind tarsi; sixth segment mostly just longer than fifth

segment. Hairs on third segment adpressed, up to nearly half diameter of the segment at its much constricted base. Rostrum reaching the middle coxae; last segment not very acute, not rostrate, about $\frac{3}{4}$ to $\frac{4}{5}$ of second joint of hind tarsi, with 11 to 14 hairs. Siphunculi slightly tinged, normal. Cauda pale, with an almost globular knob which, however, appears to be about 0.070 mm long and 0.078 mm wide, with two long apical hairs and nine to twelve hairs ventrally. Legs rather pale with the tibiae visibly brownish basally; first tarsal joints with two dorsal hairs and ventrally along posterior margin with five hairs, on fore and middle legs usually with one more ventral hair more basad. Wings with the usual *Therioaphis* venation and pigmentation.

Colour. — No colour notes on living specimens available.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinar- ia on III
					III	IV	V	VI	
1	1.68	2.17	0.05	0.17	0.70	0.47	0.42	0.21 + 0.23	10 & 14
2	1.68	2.17	0.05	0.15	0.70	0.46	0.42	0.22 + 0.23	11 & ?
3	1.62	2.06	0.05	—	0.67	0.43	0.39	0.21 + 0.21	9 & 10
4	1.54	2.13	0.05	0.16	0.71	0.47	0.39	0.20 + 0.21	10 & 11
5	1.49	2.09	0.05	0.15	0.69	0.43	0.43	0.21 + 0.22	10 & 11
6	1.45	—	0.05	0.14	0.62	0.40	0.37	0.18 + —	9 & 10

1-6, from *Lotus peregrinus* Boiss., Beisan, Israel, 10 January 1960.

Larvae.

Embryos with four longitudinal rows of long hairs, without pleural hairs. Spinal hairs on third abdominal tergite about 0.043 to 0.048 mm long.

Notes. — Only one sample, consisting of alatae and alatoid nymphs is available.

In morphology the species is nearest related to *T. litoralis* nov. spec. and at first was mistaken for that species which also infests *Lotus*. But further examination suggested that this was a case comparable to that of the two *Ononis*-infesting species in which a species with only alatae strongly resembles a species in which most viviparae are apterous.

Of *T. litoralis* quite a few alatae are present from two localities and in none of these are the antennae so thin, and so long in comparison to the body. The dorsal hairs in embryos and the ones on the posterior abdominal tergites of alatae are in *T. loti* nov. spec. significantly longer than in corresponding specimens of *T. litoralis* nov. spec. For these reasons the Israel material is here treated as a distinct species. Some more differences are mentioned in the notes on *T. litoralis* nov. spec.

Types. — Holotype: alate viviparous female, from *Lotus peregrinus* Boiss., Beisan, Israel, 10 January 1960, leg. I. Harpaz and R. van den

Bosch, in the collection of D. Hille Ris Lambers. Paratypes: 6 more or less damaged alatae, same data as holotype.

Therioaphis luteola (Börner, 1949)

Very little has been published on this aphid. Hille Ris Lambers (1952) mistook *T. subalba* Börner for this species. Quednau (1954), studying only first instar larvae, separated it by its setal pattern as did Börner, and stated that *T. luteola* has pleural hairs. Pintera (1957) apparently studied adults and first instar larvae of *T. luteola* but only adults of *T. subalba* and in this way came to the conclusion that *Therioaphis subalba* Börner was a synonym of *T. luteola* Börner. Ossiannilsson (1959) did not suspect the errors made by Hille Ris Lambers (1952) and Pintera (1957) in this respect. True *T. luteola* as far as we know has not been found in Sweden.

Our findings are different. *T. luteola* appears to live exclusively on *Trifolium pratense* L. We have material from the Netherlands, Germany (Börner's cotypes) and Austria. It occurs in two colour varieties, a pale yellow one and a whitish one, which breed true. The whitish variety we know as yet only from Bennekom, Netherlands. In morphology the two varieties are similar, but the pale yellow one has slightly more pigment in the hair-bearing processi.

Adult apterae have basically six dorsal rows of hairs of equal length. The pleural hairs are very nearly equal in length to the spinal hairs and stand on processi of the same size as those bearing the spinal hairs. Occasionally a pleural hair may be missing but this is not common in apterae viviparae, oviparae or alatae, though quite common in males.

In apterae the hair-bearing processi are large, faintly pigmented and in the yellowish form the small dusky sclerotic plates on which they stand tend to fuse, so that each segment has a pair of sclerotic plates with, on each, one pleural and one spinal hair. In the whitish form these sclerotic plates are absent or so pale as to be invisible. On third abdominal tergite the spinal hairs are about 0.059 to 0.065 mm long, the pleural hairs about 0.055 to 0.062 mm long.

In alatae the hair-bearing processi are dark, small but high and often slightly basally constricted; they are not placed on sclerotic plates; the pleural ones are quite regularly present, as large as the spinal ones and both bear equally short hairs of about 0.030 mm long.

In males a considerable part of the pleural processi and hairs may be absent, in fact a full complement as figured by Pintera (1957: 129, fig. F) is uncommon.

Embryos in all the viviparous material that we examined have more or

less complete rows of pleural hairs over the first abdominal segments. These pleural hairs are about half to two-thirds the length of the spinal and marginal hairs.

In our material of females the rhinaria cover $\frac{2}{3}$ to $\frac{5}{6}$ of third antennal segment, but to this arrangement of the rhinaria we attach no great differential value.

Alatae are rather frequently caught in yellow traps in the Netherlands, but in general the species is very rare.

Our material includes cotypic sexuales donated by the late Dr. Börner.

***Therioaphis natricis* nov. spec.**

Apterous viviparous female.

Morphological characters. — Body about 1.25 to 2.20 mm long. Tergum with the processi on which the dorsal hairs stand rather dark brown, the sclerites on which they are placed very much paler to pale, but with a rim as dark as the hair-bearing processi. Dorsal hairs on abdomen four, rarely five, per segment, with the spinal hairs of third, sixth and seventh tergites at much greater mutual distance than those on the other tergites; the sclerites on which the spinal hairs of fifth abdominal tergite are placed more or less linked by a sclerotic bridge with the marginal sclerites of that tergite, which phenomenon also may occur on seventh abdominal tergite. Spinal and marginal hairs all of about the same length, about 0.090 mm long, placed on mammiform processi of up to about 0.060 mm height. Eighth abdominal tergite with four to six hairs: two long spinal hairs on rather small processi, often on a common sclerite; and two much thinner, lateral hairs placed without processi on a small sclerite; if as customary there are more than two lateral hairs on eighth tergite, the extra hairs are smaller and placed subventrally, often not on the lateral sclerite. Head dusky, between eye and antennal base quite dark, with a pale bar dorsally connecting the middle of the eyes. Antennae mostly just shorter than body, slightly dusky, with the distal half of first segment and the apices of third, fourth and fifth segments darker; first, second and basal half of third segment smooth, the rest apicad gradually more strongly spinulosely imbricated; third segment on basal $\frac{1}{3}$ to $\frac{6}{11}$ with three to nine transversely oval rhinaria on a slightly thicker part; processus terminalis mostly a little longer than base of sixth segment, nearly twice as long as second joint of hind tarsi. Hairs on third segment about $\frac{2}{5}$ of basal diameter of the segment. Rostrum nearly reaching the hind coxae; last segment $1\frac{1}{2}$ times as long as second joint of hind tarsi, with about 20 to 33 hairs in total. Siphunculi rather large, on a conical base, with smallest diameter at distal two-thirds, pigmented like the hair-bearing

dorsal sclerites (with dark rim around the base). Cauda pallid, with the knob about 0.082 mm long and about 0.072 mm wide, with at apex two long hairs and ventrally about five to seven smaller hairs. Legs rather evenly dusky to pale brownish, with the tibiae darkest basally; first tarsal joints with two dorsal hairs and usually five to six hairs ventrally.

Colour. — Not known.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.37	1.22	0.07	0.15	0.44	0.21	0.20	0.11 + 0.13	7 & 8
2	1.62	1.51	0.08	0.16	0.52	0.29	0.24	0.13 + 0.17	8 & 9
3	1.28	1.28	0.08	0.15	0.47	0.23	0.19	0.11 + 0.15	3 & 5
4	1.40	1.40	0.08	0.16	0.49	0.27	0.23	0.12 + 0.16	4 & 5
5	1.28	1.24	0.08	0.16	0.44	0.22	0.20	0.12 + 0.14	4 & 8
6	1.44	1.43	0.08	0.16	0.52	0.27	0.22	0.13 + 0.15	5 & 7
7	1.32	1.27	0.08	0.16	0.44	0.23	0.20	0.13 + 0.14	6 & 6
8	1.51	1.49	0.08	0.16	0.55	0.29	0.23	0.12 + 0.16	6 & 7
9	1.50	1.31	0.08	0.16	0.47	0.22	0.22	0.13 + 0.13	7 & 8
10	1.32	1.47	0.08	0.16	0.51	0.29	0.24	0.13 + 0.16	6 & 7

1 (holotype), from *Ononis natrix* L. var. *stenophylla* Boiss., Beit Dagan, Israel. 16 June 1962, leg. E. Swirski; 2-10, idem, 10 April 1962.

Alate viviparous female.

Morphological characters. — Much like apterous viviparous female, but a distinct dark bar present on the underside of the head; pleural intersegmental sclerites on abdomen dark brown, linear; those between fourth and fifth tergites often fused with the spinal sclerites of fourth tergite, sometimes, as in *T. ononidis* Kaltenbach, also with the spinal sclerites of fifth segment, and the latter with a lateral extension that connects them with the marginal sclerites of fifth tergite. Dorsal hairs in the paratype specimen small and thin, slightly knobbed, the spinal ones on third tergite only 0.016 mm long and those on first tergite not longer, all on small process; the spinal ones on eighth tergite about 0.052 mm long, not much thicker than those on more anterior tergites; in the second specimen dorsal hairs stout, spinal ones on third tergite about 0.040 mm long, those on eighth tergite about 0.060 mm long. Antennae about as long as body; third segment with some 13 to 21 rhinaria over $\frac{4}{5}$ to $\frac{9}{10}$ of their length. Wings with the normal *Therioaphis venation*, the veins distinctly vaguely banded, rather heavily pigmented.

Colour. — Not known.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.49	1.34	0.08	0.16	0.48	0.26	0.22	0.11 + 0.15	14 & 13
2	2.11	2.31	0.09	0.19	0.70	0.49	0.44	0.21 + 0.32	21 & ?

1, from *Ononis natrix* L. var. *stenophylla* (?), Beit Dagan, Israel, 6 June 1962; leg. E. Swirski; 2, from *Populus*, Tel-Aviv, Israel, 1 May 1953, leg. E. Swirski.

Notes. — When the rest of our *Therioaphis* were classified, we were left with one alate female, taken on a poplar in Israel in 1953. This specimen had the rostral chaetotaxy of *T. alatina* nov. spec., but its eighth abdominal tergite had lateral hairs like *T. ononidis* Kalténbach. As at that time no member of the *ononidis* group had been recorded from the many species of *Ononis* that are known to occur in Israel, the second author during a brief visit to Israel searched for such aphid, but with negative results. However, our colleagues Drs. E. Swirski and I. Harpaz came to our help. Dr. Swirski collected aphids like the mentioned alate specimen on *Ononis natrix* L., and Dr. Harpaz obtained normal *T. ononidis* from *Ononis leiosperma* Boiss.

To our surprise the predominant viviparous morph of Dr. Swirski's aphids is apterous while from a yellow-flowering *Ononis* we had expected alatae only. Not only in this respect, and in the chaetotaxy of the eighth abdominal tergite does the species, *T. natricis* nov. spec., resemble *T. ononidis* Kalténbach, but also in the fusion of the spinal sclerites with the intersegmental sclerites in alatae viviparae. By the presence of four to six hairs on the eighth abdominal tergite, alatae of this species can easily be separated from those of *T. alatina* nov. spec., while all morphs can be distinguished from those of *T. ononidis* Kalténbach by their more hairy last rostral segment.

The alate from *Populus*, which led to the search of *Ononis* in Israel, is rather different from the single alate from *Ononis natrix* at our disposal, not only in size, but also in the hairs on the abdomen, as mentioned in the description. For that reason it is not included in the type series.

Types. — Holotype: apterous viviparous female from *Ononis natrix* L. var. *stenophylla* Boiss., Beit Dagan, Israel, 16 June 1962, leg. E. Swirski, in the collection of D. Hille Ris Lambers. Paratypes: 9 apterous viviparous females from *Ononis natrix* L. (var. *stenophylla*?), Beit Dagan, 10 April 1962, leg. E. Swirski. 1 alate viviparous female, same data but 6 June 1962.

Further material: 1 alate viviparous female from *Populus*, Tel-Aviv (Israel), 1 May 1953, leg. E. Swirski.

***Therioaphis obscura* nov. spec.**

Apterous viviparous female.

Morphological characters. — Body about 1.35 to 1.80 mm long. Tergum

with the processi that bear hairs distinctly sclerotic and at least at apex pigmented. Dorsal hairs present in four longitudinal rows, the pleural ones being absent. Spinal hairs of third, fifth and seventh abdominal tergites at much greater mutual distances than other spinal hairs. Spinal and marginal hairs on third abdominal tergite about 0.070 mm long and placed on smooth or nearly smooth mammiform processi of about 0.035 mm high; other hairs and processi of similar size, but marginal hairs of fifth to seventh segments usually very much smaller, about 0.040 mm long; eighth tergite with two hairs. Mesonotum and first to fifth abdominal tergites with broad, paired, spino-pleural sclerotic bars of strongly variable — from almost colourless to brown — pigmentation, usually with a conspicuously darker border, but paler to almost colourless around a processus that bears a hair; these processi either entirely very dark, especially the marginal ones of first to third segments, or with pale base and dark to very dark apex; their hairs nearly always dark. Also ventrally usually more or less pigmented sclerotic bars, complete or fragmentary, present. Head pale to dark with the usual darker ventral band between the anterior margins of the compound eyes. Antennae a little shorter to longer than body, rather dark, darker towards apex; third segment on the incrassate basal $\frac{1}{4}$ to $\frac{2}{5}$ part with one (very rarely) to nine

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.45	1.38	0.06	0.19	0.48	0.24	0.24	0.15 + 0.14	1 & 4
2	1.64	1.54	0.07	0.19	0.51	0.30	0.28	0.15 + 0.17	6 & 8
3	1.60	1.69	0.06	0.18	0.56	0.33	0.31	0.17 + 0.18	8 & 8
4	1.77	1.66	0.06	0.20	0.52	0.31	0.28	0.15 + 0.16	4 & 7
5	1.36	1.48	0.05	0.16	0.51	0.29	0.24	0.15 + 0.16	5 & 8
6	1.60	1.69	0.06	0.18	0.60	0.34	0.29	0.16 + 0.17	6 & 7
7	1.53	1.58	0.06	0.17	0.55	0.31	0.28	0.15 + 0.16	8 & 8
8	1.48	1.65	0.05	0.19	0.52	0.34	0.30	0.16 + 0.19	7 & 8
9	1.36	1.66	0.05	0.18	0.56	0.34	0.29	0.16 + 0.17	8 & 8
10	1.55	1.75	0.05	0.18	0.60	0.35	0.31	0.18 + 0.18	6 & 8
11	1.49	1.55	0.04	0.16	0.53	0.34	0.29	0.15 + 0.16	9 & 9
12	1.40	1.71	0.04	0.16	0.56	0.34	0.31	0.16 + 0.19	5 & 8
13	1.57	1.71	0.04	0.16	0.56	0.37	0.30	0.16 + 0.18	9 & 9

All from *Dorycnium suffruticosum* Vill. 1¹⁾-2, 1 km N. of Antibes, dépt. Alpes Maritimes, 5 April 1959; 3 (holotype)-4, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 7 June 1959; 5-6, La Brillianne, dépt. Basses Alpes, 5 September 1959; 7, 5 km W. of Valensole, dépt. Basses Alpes, 5 September 1959; 8, Moustier Ste Marie, dépt. Basses Alpes, 8 October 1959; 9-10, Bajardo, reg. Liguria, 12 September 1961; 11-13, from unidentified plant, Casa de la Selva, Catalonia, 11 August 1953; 1-8, from France; 9-10, from Italy, leg. Miss A. W. Beek and D. Hille Ris Lambers; 11-13, from Spain, leg. H. Franz.

1) Fundatrix?

transversely oval rhinaria in a row; processus terminalis usually just longer than base of sixth segment, nearly twice as long as second joint of hind tarsi. Hairs on third segment short, adpressed, only $\frac{1}{3}$ of diameter of the segment at its constricted base. Rostrum reaching to just past middle coxae; last segment conspicuously pointed, about $\frac{3}{4}$ of second joint of hind tarsi, with eight to ten hairs. Siphunculi conical or cylindrical on conical base, in total about 0.04 to 0.06 mm long, pale to dark, smooth, easily visible, in the middle about 0.04 to 0.05 mm thick, without flange. Cauda with a dark trapezoid knob, which is about 0.037 mm long, but 0.043 mm wide, with at apex two stout hairs, ventrally with about nine to eleven shorter hairs. Legs pigmented like the abdominal sclerites; first tarsal joints with two dorsal hairs, four long and one short ventral hairs along distal margin and often one ventral hair more basad.

Colour. — In life banded grey with marginally and spinally the hair-bearing processi visible as black spots. Ventrally slightly translucent grey with vague to distinct dark transverse lines.

Alate viviparous female.

Morphological characters. — Much like apterous viviparous female, but the sclerotic bars on abdominal dorsum usually much reduced to eye-shaped plaques with dark rim and pale central area on which the blackish hair-bearing processi are placed, the latter much smaller than in apterae and the spinal hairs on third abdominal segment only about 0.030 mm; ventral sclerites variably pigmented, usually quite distinct, rarely absent. Antennae hardly longer than in apterae; third segment with six to eleven rhinaria in a row which does not reach the middle of the segment. Wings with the normal *Therioaphis* venation and pigmentation.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.75	1.55	0.08	0.19	0.49	0.32	0.29	0.15 + 0.16	6 & 6
2	1.75	1.81	0.08	0.20	0.60	0.36	0.35	0.17 + 0.19	8 & 11
3	1.69	1.77	0.07	0.19	0.59	0.36	0.33	0.17 + 0.18	8 & 9
4	1.62	1.72	0.05	0.19	0.59	0.36	0.31	0.15 + 0.19	9 & 9
5	1.66	1.67	0.06	0.18	0.54	0.33	0.30	0.17 + 0.19	7 & 7
6	1.60	1.66	0.04	0.17	0.55	0.34	0.30	0.14 + 0.19	9 & 9
7	1.47	1.57	0.04	0.18	0.50	0.34	0.27	0.14 + 0.19	6 & 8

1-5, from *Dorycnium suffruticosum* Vill. 1, 1 km N. of Antibes, dépt. Alpes Maritimes, 5 April 1959; 2, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 7 June 1959; 3, Biot, dépt. Alpes Maritimes, 28 August 1959; 4, La Brillianne, dépt. Basses Alpes, 5 September 1959; 5, Moustier Ste Marie, dépt. Basses Alpes, 8 October 1959; 6-7, from unidentified plant, Casa de la Selva, Catalonia, 11 August 1953; 1-5 from France; 6-7, from Spain, leg. H. Franz.

Colour. — In life as in apterae and in dorsal view not very easily recognizable as alatae.

Oviparous female.

Morphological characters. — Very much like apterous viviparous female, but ventral pigmentation more conspicuous on posterior half of abdomen. Eighth abdominal tergite, besides the two spinal hairs on processi (which almost coalesce), with a considerable number of long and short hairs, of which the inner, longest pair stand on strong sockets and are rather distinctly pigmented and blunt, while the others are acute and pale. Caudal knob nearly globular, only about 0.060 mm wide and long. Subanal plate not bilobed, but entire and semicircular. Seventh and eighth abdominal segments more or less extracted into a very thick ovipositor. Hind tibiae not darker than the other tibiae, swollen to about $1\frac{3}{4}$ times the middle diameter of the middle tibiae, with about 50 to 70 roundish, rather large pseudosensoria on the incrassate basal $\frac{1}{2}$ to $\frac{3}{5}$ part.

Colour. — Probably as in apterae viviparae, but more yellowish as to ground colour.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.69	1.44	0.05	0.11	0.51	0.24	0.26	0.14 + 0.16	4 & 5
2	1.54	1.46	0.05	0.11	0.49	0.27	0.27	0.15 + 0.16	6 & 6
3	1.80	1.56	0.05	0.13	0.52	0.29	0.29	0.15 + 0.17	5 & 7
4	1.61	1.37	0.05	0.11	0.45	0.26	0.23	0.15 + 0.15	5 & 7
5	1.60	1.39	0.05	0.11	0.47	0.23	0.24	0.15 + 0.15	2 & 2

All from *Dorycnium suffruticosum* Vill. 1-3, Moustier Ste Marie, dépt. Basses Alpes, France, 8 October 1959; 4-5, 5 km N.W. of Moustier Ste Marie, dépt. Basses Alpes, 1 November 1959.

Alate male.

Morphological characters. — Much like alate female, but slightly more pigmented and the sclerotisation of abdomen much more reduced and the sclerites hardly or not pale around the small hair-bearing processi. Antennae distinctly longer than body; third segment with twelve to twenty apical increasingly more rounded rhinaria over whole length, fourth with three to seven, fifth with four to six roundish rhinaria. Cauda with a small knob with about six to eight hairs on the underside and two longer apical ones. Subanal plate not deeply incised. Genitalia normal.

Colour. — Not noted.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on segments		
					III	IV	V	VI	III	IV	V
1	1.49	1.54	0.07	0.13	0.48	0.31	0.29	0.15 + 0.18	17 & 17	6 & 7	6 & 5
2	1.44	1.67	0.06	0.13	0.51	0.35	0.30	0.15 + 0.18	14 & 15	5 & 6	5 & 4
3	1.38	1.65	0.06	0.13	0.54	0.34	0.31	0.15 + 0.17	16 & 20	6 & 3	6 & 5
4	1.29	1.62	0.06	0.11	0.51	0.35	0.29	0.16 + 0.17	13 & 13	6 & 5	6 & 4

1-4, from *Dorycnium suffruticosum* Vill., Moustier Ste Marie, dépt. Basses Alpes, France, 8 October 1959.

Larvae.

First instar larvae with the dorsal hairs on dark sclerotic tubercles, only with spinal and marginal hairs, no pleural hairs present. Spinal hairs on third, fifth and seventh abdominal tergites with greater distance between them than those on other tergites. Spinal hairs on third abdominal tergite about 0.043 mm long. Antennae of four segments, third about 0.25 mm long, fourth about (0.087 + 0.080) mm. Last rostral segment acute, rostrate, with nine to eleven hairs.

Notes. — Throughout the area north of the French and Italian Riviera this aphid could be threshed off *Dorycnium suffruticosum* Vill. wherever this locally common plant was encountered. Four apterae and two alatae were found in a mixture of aphids collected by Prof. H. Franz, Vienna, in the maquis in Spain. The Spanish specimens are much paler than our other material. This aphid lives on the underside of the leaves, often very numerously. Alatae were found from April to October but rarely in considerable number; the apterous viviparous morph is by far the most common. Sexuales appeared from October till the end of the observations in the beginning of November when apterae and alatae containing embryos were also still encountered. In view of the early find in April of apterae viviparae that (except perhaps no. 1 in the measurements) apparently are not fundatrices, hibernation as viviparae in sunny, low altitude spots would seem to occur besides hibernation as eggs at cooler, higher places.

The aphid in many respects resembles *Therioaphis dorycnii* (Pintera), which apparently does not produce apterous viviparous females, as already recorded by Pintera (1957). *T. dorycnii* alatae and oviparae differ from those of *T. obscura* by a number of small characters as follows.

T. dorycnii (Pintera)*T. obscura* nov. spec.

Alate female.

Alate female.

1. Spinal hairs on third abdominal tergite: 0.016 mm.

1. Spinal hairs on third abdominal tergite: 0.035 mm.

- | | |
|---|---|
| 2. Small dark-bordered sclerites around hair-bearing processi. | 2. Broken, eye-shaped bars across tergites. |
| 3. Eighth tergite with four to five hairs. | 3. Eighth tergite with two hairs. |
| 4. Marginal processi on third abdominal tergite usually pale or largely pale. | 4. All marginal processi dark. |
| 5. Rhinaria covering nearly half or a little more of third antennal segment. | 5. Rhinaria not nearly reaching the middle of third antennal segment. |
| 6. No distinct ventral sclerites. | 6. Distinct pigmented ventral sclerites usually present. |

Oviparous female.

1. Spinal hairs on third abdominal tergite: 0.078 to 0.080 mm.
2. As for alate.
5. As for alate.

Oviparous female.

1. Spinal hairs on third abdominal tergite: 0.070 mm.
2. As for alate.
5. As for alate.

On 4 August 1959 a sample (10A) consisting of six alatae was taken on *Dorycnium suffruticosum* Vill., 5 km. N.E. of Vallauris, dépt. Alpes Maritimes. Three of these show the differential characters 1 and 2 of *T. dorycnii*, but are otherwise typical *T. obscura* nov. spec. The other three specimens have all the differential characters of alate *T. obscura*, though they are somewhat teneral.

The general impression is that *T. dorycnii* (Pintera) and *T. obscura* nov. spec. are indeed very nearly related. Both inhabit very closely related species of the genus *Dorycnium*.

Types. — All from *Dorycnium suffruticosum* Vill. Holotype: apterous viviparous female (measurements no. 3), 5 km N.E. of Vallauris, dépt. Alpes Maritimes, France, 7 June 1959, in the collection of D. Hille Ris Lambers. Paratypes: 58 apterous viviparous females, 1 alate viviparous female, 1 km N. of Antibes, dépt. Alpes Maritimes, 5 April 1959; 70 apterous viviparous females, 9 alate viviparous females, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 7 June 1959; 1 alate viviparous female, Biot, dépt. Alpes Maritimes, 28 August 1959; 43 apterous viviparous females, 2 alate viviparous females, La Brillianne, dépt. Basses Alpes, 5 September 1959; 6 apterous viviparous females, 1 alate viviparous female, 5 km W. of Valensole, dépt. Basses Alpes, 5 September 1959; 8 apterous viviparous females, 3 alate viviparous females, 20 oviparous females, 6 males, Moustier Ste Marie, dépt.

Basses Alpes, 8 October 1959; 13 apterous viviparous females, 7 oviparous females, 1 male, 5 km N.W. of Moustier Ste Marie, dépt. Basses Alpes, 1 November 1959.

Further material: 6 alate viviparous females, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, France, 4 July 1959. From Italy: 2 apterous viviparous females, Bajardo, reg. Liguria, 12 September 1961, leg. Miss A. W. Beek & D. Hille Ris Lambers. From Spain: 4 apterous viviparous females and 2 alate viviparous females, host plant not identified, Casa de la Selva, Catalonia, 11 August 1953, leg. H. Franz.

Therioaphis ononidis (Kaltenbach, 1846)

Until now only one *Therioaphis*, *T. ononidis* Kaltenbach, had been recorded from *Ononis*. But in the course of our studies it was found that there are three taxa on the members of the genus *Ononis*, differing not only in host preference, but also in morphology and wing development.

As far as we know, pink-flowered *Ononis* have only one species, which occurs from England to the Near East. There is no doubt that this is Kaltenbach's *T. ononidis*, as near Aix, where this author collected, only the pink-flowered *Ononis repens* L. and *O. spinosa* L. occur. Part of Kaltenbach's material exists in the British Museum (Natural History), London, according to Doncaster (1961). We had at our disposal material from *O. spinosa*, collected on Dutch territory near Aachen, besides a considerable number of samples from various other European countries and Israel.

The material from pink-flowered *Ononis* shows such variation as might be expected in a *Therioaphis* with a wide geographical distribution. The predominant viviparous morph is apterous; the last rostral segment is hairy, but never as hairy as in species from yellow *Ononis*; the eighth abdominal tergite shows mostly four hairs, very rarely six hairs when there are two pairs of marginal hairs, and exceptionally three hairs when one of the customary marginal hairs is absent in viviparae. Oviparae, like those of *T. alatina* nov. spec., have more hairs on the eighth abdominal tergite than viviparae.

Brachypterous viviparae are mostly rare, just as in related species.

It is remarkable that in the Netherlands *Ononis spinosa* in the centre of the country in 30 years of observation has never been found infested with *T. ononidis*, whereas the species is quite common on the same host in the southern part of the province of Limburg and on *O. repens* var. *mitis* Spenn. in the dunes along the North Sea coast.

Some confusion about the identity of this aphid has occurred. Theobald (1927 and earlier papers) believed that *Chaitophorus maculatus* Buckton

and *Callipterus trifolii* Monell were the same species as *T. ononidis* Kaltenschach. Consequently he recorded *T. ononidis*, besides from *Ononis*, from a number of host plants on which it almost certainly cannot live.

The characters by which this species can be distinguished from the very similar *T. alatina* nov. spec. and *T. natricis* nov. spec. are mentioned in the key.

***Therioaphis riehmi* (Börner, 1949)**

This species, described as the type of *Myzocallidium* Börner, has as far as we know not been mistaken for other species. Pintera (1957) gave a satisfactory description of the alate vivipara and the male. We will add a few notes on the ovipara.

Like others we found this species only multiplying on *Melilotus* spp. on which it is frequently quite common in Europe and America, but Quednau (1954) recorded it also from *Trigonella foenum-graecum* L. We took one alate on *Ononis natrix* L. in Southern France in an area where *Melilotus* was nearby.

The alatae can easily be recognized by their very large transversely oval spinal sclerotic plates on the abdomen that are never very dark, unusually clouded, and sometimes slightly coalescing on fourth and fifth tergites. The plates are always mottled smoky with darker rims, irregular in their lateral outline, and very much paler than the low marginal processi which, excepting those on third segment, are at least partly black. The chaetotaxy is not completely constant, for sometimes a pleural hair occurs so that one of the plates, on third or fourth segment, bears two about equally short hairs, neither placed on elevated tubercles or processi.

Oviparae have basically the same abdominal sclerotisation as alatae, but the spinal sclerites are even larger and much more evenly pigmented, and the marginal processi do not differ very much from the spinal plates in pigmentation. The spinal hairs are considerably longer and stouter than in alatae, on third abdominal tergite about 0.030 mm, on seventh about 0.052 mm, and they are placed on quite small conical processi. Also in this morph the third and fourth abdominal segments may sometimes have a pleural hair, in this case much smaller than the nearest spinal hair. The number of rhinaria and their arrangement is like that of alatae from the same colony.

In the males the spinal abdominal sclerites are even more transversely oval than in alatae, but they are much smaller, rather evenly dark and not much paler than the marginal processi which are all equally dark.

As in other species (cf. *T. subalba* in Sweden, p. 35) sexuales develop

early. The first author took oviparae on 8 September 1956 near Presque Isle, Maine, U.S.A., and both sexes on 21 September 1956 at Bennekom, Netherlands.

Some cotypic alatae donated by Dr. Börner were available besides material from Utah and Maine, U.S.A., and from various European countries.

***Therioaphis subalba* Börner, 1949**

Börner (1949) and Quednau (1954) rightly characterized the species by its first instar larvae which have no pleural hairs. Hille Ris Lambers (1952), not examining the embryos in his rather poor mounts, identified the Swedish *Therioaphis* from *Trifolium medium* L. as *Therioaphis luteola* (Börner). Pintera (1957), although studying the embryos and first instar larvae of *T. luteola* from *Trifolium pratense* L., also did not examine the embryos in Swedish specimens from *Trifolium medium* and identified them as *T. luteola* (Börner), placing *T. subalba* Börner as a synonym of *T. luteola*. Then Os-
siannilsson (1959), referring to Hille Ris Lambers and Pintera, listed his Swedish catches from *Trifolium medium* as *Therioaphis luteola* (Börner).

A careful re-examination of the material has shown that all the material from *Trifolium medium* from Sweden and Austria that we have, contains embryos without pleural hairs and therefore is *T. subalba* Börner and not *T. luteola* (Börner). Cotypes of sexuales received from Dr. Börner and reared on *Trifolium alpestre* L. have fewer pleural hairs than nearly all Swedish specimens, but agree with Austrian specimens from *Trifolium medium*.

Apterous females frequently have a number of pleural hairs, very rarely a full complement as figured by Pintera (1957: 129, fig. M). Even if many pleural hairs are present, they are all or nearly all considerably smaller than the spinal hairs on the same segment, and often some are half as long as the spinal hairs. Even if, as may happen, some are three quarters of the length of the nearest spinal hair, they are placed on processi that are very much smaller than those bearing the spinal hairs. Sometimes pleural and spinal hairs stand on joint sclerites and sometimes two very small pleural hairs replace one large pleural hair. Never have we seen a specimen from *Trifolium medium* in which even more or less complete rows of pleural hairs of very nearly the same size as the spinal hairs stood on processi of the same size as those bearing the spinal hairs. Specimens in which no pleural hairs occur were sparingly found among others in Austria and Sweden. They resemble Börner's types from *Trifolium alpestre* which, however, occasionally also show one or two pleural hairs, contrary to his original description.

Two alatae are available so that we can provide differential characters for that morph. They are from the same sample as the one of which Pintera (1957: 129, fig. V) gives a figure of the setal pattern (*Trifolium medium*, Uppsala, Norby, Sweden, 4 July 1950, leg. Ossiannilsson) in which pleural hairs are nearly absent. Ours are similar and very unlike alatae of *T. luteola* (Börner), in which a full complement of pleural hairs is present.

In our material of females the rhinaria on third antennal segment cover $\frac{1}{2}$ to $\frac{2}{3}$ part of the segment in apterae, $\frac{3}{5}$ to $\frac{4}{5}$ part in alatae.

In the single male at our disposal a few pleural hairs are present on the abdomen, but they are very small and, in contrast to the spinal hairs, not placed on processi, but on small, flat, inconspicuous sclerites. It was collected on 15 August 1948 near Stockholm on *Trifolium medium* by Dr. Ossianilsson and D. Hille Ris Lambers.

Summarizing we can state that all female morphs of *T. subalba* Börner can be separated from all female morphs of *T. luteola* (Börner). In *T. luteola* pleural hairs are normally present in considerable number and they are in adults of about the same length and stand on equally large processi as the nearest spinal hairs. In *T. subalba*, however, the pleural hairs if present in adults are always considerably, and often very much, smaller than the spinal hairs and if they are placed on processi, these are much smaller than the nearest spinal processi. Whether the arrangement of the rhinaria can help in distinguishing these two species remains to be seen.

Both *T. luteola* and *T. subalba* have as apterae a more or less marked blackish spot or blotch on the marginal hair-bearing processi of the second abdominal segment, whereas the other processi are usually all uniformly smoky.

***Therioaphis tenera* (Aizenberg, 1956)**

Both Aizenberg (1956) and Pintera (1957) have given very good descriptions and figures of this species, which first seems to be mentioned under the nomen nudum *Therioaphis tenera* Aizenberg in a paper by Tamarina (1955) that we could not obtain. According to Pintera she records it from Ukraine, Moscow, Stalingrad, the Ural and Altai mountains from *Caragana arborescens* Lam., and from Ukraine, the Ural and Altai mountains from *Caragana frutex* C. Koch.

Our scanty material consists of an alate and a nymph from Moscow, donated by Dr. Holman and three alatae and a nymph from Bashtanko (Nikolajevsk) donated by Mrs. Mamontova-Solucha. The samples agree in their antennal structure which we used in the key, but as to sclerotic pattern they seem slightly different. The Moscow alate has distinctly very large

sclerotic plates on the abdomen of which those on first tergite are pale and mutually free, but those on second, third and fourth tergites are caudad gradually darker smoky and partially fused to sclerotic transverse bars; the marginal processi are quite dark, on second and fourth segments blackish. In Mrs. Mamontova's specimens the sclerotisation is not well visible, but the very small processi that bear spinal hairs are considerably more pigmented than the vague plates on which they stand, at least in one specimen. In the other two specimens all spinal sclerites are, perhaps through the applied clearing process, quite pale, but in one specimen one hair-bearing tubercle on the fifth segment is conspicuously brown.

The spinal hairs in alatae on the first four abdominal tergites are within one specimen variable in size; the longest are up to 0.045 mm, the shortest about 0.021 mm.

In embryos the spinal hairs are rather long, on the third abdominal tergite about 0.043 mm long.

The species has not yet been found outside Russia.

***Therioaphis trifolii* (Monell, 1882)**

This aphid, usually under the name *Therioaphis* or *Pterocallidium maculatum* (Buckton, 1899), has been discussed in several papers in recent years because of the damage it has caused to *Medicago sativa* L. in North America. We obtained a considerable number of samples from various states in North America, Europe and Asia, collected from a variety of host plants. Some breeding was done and transfer tests were made.

It appears that the material varies considerably, more or less in the same way as other *Therioaphis* species of wide distribution. Variable characters studied are: 1, The length of the dorsal hairs in adults, and embryos or first instar larvae; 2, The number and arrangement of secondary rhinaria; 3, The pigmentation of the hair-bearing processi and the sclerotisation and pigmentation of the underside of the abdomen, especially in alatae; 4, The length of the antennae; 5, The production of sexual morphs.

1. The variability of the length of the dorsal hairs in apterae corresponds to that in the embryos inside. Samples with short haired apterae contain embryos with short hairs. Börner (1949) used length of hairs, combined with the pigmentation of the dorsal tubercles in males for separating *Pterocallidium lydiae* Börner, 1949 (from *Trifolium repens* L.), *P. maculatum* (Buckton) Börner, 1949 (from *Medicago falcata* L. and *M. sativa* L.), and *P. propinquum* Börner, 1949 (from *Trifolium hybridum* L. and *T. arvense* L.). The first author in 1950 made transfer tests with Dutch speci-

mens from all of these hosts and found neither host specificity, nor morphological differences associated with any of the mentioned host plants. Examination of type material submitted by Dr. Börner did not confirm the presence of the differences that he mentioned in his descriptions, although there was some variation in the length of dorsal hairs and in pigmentation. Quednau (1954) in his fascinating paper also came to the conclusion that Börner's three species are synonyms of *T. trifolii* Monell. He wrote that *T. trifolii* is the type of *Pterocallidium* Börner, 1949, but Börner (1949) indicated *Chaitophorus maculatus* Buckton, 1899, as type-species.

The length of the hairs, e.g., on the third abdominal tergite certainly varies between samples. An extreme was found in several samples with remarkably black dorsal sclerites from *Astragalus*. The mentioned hairs only exceptionally exceed 0.060 mm in these samples and are usually much shorter. Also the embryos inside show unusually short hairs. These samples from *Astragalus* we provisionally consider a subspecies particularly because also the last rostral segment is about 10 to 15 % shorter than it is in comparable samples from other host plants even in the same area. It is described hereafter as subspecies *brevipilosa* nov. subsp.

Specimens with conspicuously long hairs usually have pale dorsal tubercles, but in a sample from *Onobrychis sativa* Lam. from Iran the hairs are long, and the dorsal tubercles evenly dark. Long haired specimens show on the third abdominal tergite hairs up to 0.100 mm and longer, and their embryos have knobbed hairs with cylindrical shafts of up to 0.050 mm on the third abdominal tergite.

Between these extremes one encounters intermediates so that on the basis of length of dorsal hairs alone a subdivision is risky.

2. The number and arrangement of the secondary rhinaria, in combination with the sclerotisation ("dashes") on the underside of the abdomen in alatae has been used by Dickson (1959) for separating the spotted alfalfa aphid ("SAA") from the yellow clover aphid ("YCA") in North America, a very interesting subject on which Ossiannilsson (1959) has given comments. Dickson finds that YCA, for which he uses the name *Pterocallidium trifolii*, has rhinaria covering more than half of the third antennal segment, and an unadorned underside of the abdomen in alatae; it lives on *Trifolium* spp. in the more Eastern part of North America, produces normal sexuales and hibernates as eggs. His SAA he calls *P. maculatum* Buckton and it is stated to have fewer rhinaria confined to the basal half of third antennal segment and dark (sclerotic) ventral dashes or bars. It infests especially *Medicago sativa* (besides a great number of other Papilionaceae including *Trifolium*

spp. in the more Western and Southern States) and only exceptionally produces sexuales in a very small number. We have studied a considerable number of samples from North America and fully agree with Dickson that his subdivision holds for North American material.

Ossiannilsson (1959) examined Swedish material on the characters mentioned by Dickson and wrote that as to rhinarial number and arrangement his specimens are intermediate between Dickson's SAA and YCA, while no dashes are present on the underside of the abdomen in alatae. His specimens came from *Trifolium*, *Lotus* and *Medicago falcata*.

Our material from various countries as to rhinarial distribution and arrangement shows considerable variation. Material from Sweden, the Netherlands, Central France, Germany, Austria and Switzerland taken on *Trifolium* spp., *Medicago lupulina* L., *M. sativa* and *M. falcata* is mostly more or less intermediate between SAA and YCA, but we have samples with typical YCA antennae from the Netherlands and Central France, besides samples with rhinaria like SAA from the same areas. The first author observed and collected on *Trifolium repens* in Eastern Canada and found the insects as to colour and behaviour towards the plant indistinguishable from Dutch specimens.

Samples from Southern France and Asia are in their rhinaria more like SAA, whatever their host plants.

We find it impossible to sort our samples on the basis of the number and arrangement of the rhinaria in so far as this material has been collected in Europe and Asia.

3. Graham (1959) has investigated the influence of temperature on pigmentation in SAA in North America. He wrote that specimens developed at 11° C had black dorsal spots, others reared at 35° C had almost invisible dorsal spots. This would seem to hold also for European insects of the YCA type, which in the autumn and at high altitudes develop evenly dark dorsal spots, whereas particularly Mediterranean samples have spots with very large pale centers. One might think that the development of ventral dashes on the abdomen was correlated with the pigmentation of the dorsal spots, but it is not as simple as that. American SAA even when the dorsal spots are partly pigmented, tend to have ventral "dashes", European autumnal material with dark dorsal spots may rarely have insignificant ventral dashes, but our samples from *Astragalus* (France) and *Onobrychis* (Iran) have quite black dorsal spots and no trace of ventral dashes. Only from Israel do we have samples in which ventral dashes somewhat resembling those in American SAA occur, but not regularly.

Our material from India from *Medicago sativa* has no ventral dashes on the abdomen of alatae. We therefore doubt whether the name *maculata* Buckton could be applied to Western American SAA. For though Buckton described his *Chaitophorus maculatus* from India, from *Medicago sativa* and although his material was shown to have traces of ventral dashes on the abdomen, other samples from this area do not have ventral sclerotisation.

4. We find considerable variation in the relative length of the antennae. There is in this respect a more or less general pattern that samples from colder climates (or higher altitudes) have shorter antennae, those from warmer regions longer antennae. As also the third antennal segment relatively increases in length, this might partly explain why the more southerly samples have their rhinaria more generally confined to the basal half of the third antennal segment, if the increase in length concerns especially the distal portion of the segment. In specimens developed at low temperature the antennae tend to become shorter and stouter, often in correlation with the degree of pigmentation of the dorsal spots.

5. The production of sexuales is normal in most of Europe, but in the coastal sub-tropical Mediterranean area we have not yet found sexuales. Therefore we do not know whether anholocyclic strains (strains that can not or hardly produce sexuales) occur in Europe, as we made no experiments with different temperatures and day-lengths.

Dickson (1959) suggested that all SAA in North America may be descended from a single specimen or clone accidentally introduced. In view of the exclusively (?) parthenogenetic reproduction and the surprising homogeneity of American SAA this hypothesis looks most probable. Ossiannilsson (1959), discussing Dickson's statement, adds that also American YCA might well have resulted from a single introduction and we would like to add that the equally surprising homogeneity of American YCA is such that the introduced specimen must have been homozygous for a very considerable number of characters. On the bases of our studies we have become convinced that Dickson and Ossiannilsson are right in this respect. But we disagree when Dickson applies different specific names, and Ossiannilsson subspecific names to American SAA and YCA.

Therioaphis trifolii (Monell) exhibits a quite normal intraspecific variability not exceeding that of other *Therioaphis* with a comparable geographical distribution. If we left out of consideration all but six samples of our material we could justifiably describe six subspecies of *T. trifolii*, distinguishable by the five variable characters that we discussed above. However, when the complete available material is considered, such a subdivision

becomes impossible. And only through the remarkable incident that two, and only two, rather extreme varieties of the variable species have been introduced into North America, can SAA and YCA be distinguished. The common names Spotted Alfalfa Aphid and Yellow Clover Aphid should be sufficient for indicating the two varieties of *Therioaphis trifolii* (Monell) that have been introduced into North America.

To the already long list of Leguminous host plants we add: *Medicago arborea* L., *M. polycarpa* Willd., *Onobrychis sativa* Lam. in Southern France and *Ononis leiosperma* Boiss. in Israel.

***Therioaphis trifolii brevopilosa* nov. subsp.**

Apterous viviparous female.

Morphological characters. — Body about 1.40 to 1.90 mm long, broadly oval. Tergum with the hairs, the processi on which they stand and the sclerites bearing these processi conspicuously dark pigmented, mostly black, and only the marginal ones and those on the posterior tergites normally with a somewhat paler center. Dorsal hairs as in the main species indistinctly in six longitudinal rows, because between the spinal rows there are mostly none to three smaller „accessory” hairs on smaller sclerites, so that on each of first to fifth abdominal tergites about six to nine hairs are present; sixth and seventh tergites with four hairs, eighth with two to four hairs. Spinal and marginal hairs considerably shorter than in the main species, on third abdominal tergite up to 0.035 to 0.060 mm long and then only about three to five times as long as their maximum subapical thickness, the pleural and “accessory” hairs about $\frac{1}{2}$ to $\frac{2}{3}$ of the length of the spinal hairs; hair-bearing processi very little developed and the plates on which they stand only a little convex. Head dusky with the anterior half darker. Antennae mostly a little shorter than body, rather evenly dusky; third segment on basal half with five to ten sometimes partly round rhinaria; processus terminalis usually just longer than basal part of sixth segment, about $1\frac{1}{2}$ times as long as second joint of hind tarsi. Rostrum not reaching the middle coxae; last rostral segment quite short, only about 0.078 mm, about $\frac{2}{3}$ of second joint of hind tarsi. Siphunculi pigmented, quite short, shorter than in the main species, on a plate that is pigmented like the nearest marginal processi. Cauda pigmented like the sclerites on eighth abdominal tergite, the acorn-shaped knob about 0.095 mm long and 0.070 mm wide, with two long apical hairs and eight to eleven shorter ventral hairs. Legs dusky; first tarsal joints with two dorsal hairs, four long and one short hair ventrally along distal margin and usually one more ventral hair more basad.

Colour. — Notes lost.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.73	1.66	0.03	0.19	0.53	0.33	0.33	0.16 + 0.18	8 & 8
2	1.73	1.62	0.03	0.17	0.50	0.32	0.31	0.16 + 0.19	8 & 9
3	1.52	1.53	0.03	0.17	0.48	0.31	0.28	0.15 + 0.18	7 & 7
4	1.62	1.64	0.03	0.18	0.53	0.32	0.30	0.16 + 0.19	8 & 10
5	1.73	1.57	0.03	0.19	0.48	0.31	0.30	0.16 + 0.19	7 & 9
6	1.76	1.54	0.03	0.20	0.49	0.29	0.30	0.16 + 0.17	7 & 8
7	1.57	1.51	0.03	0.18	0.49	0.28	0.29	0.15 + 0.18	8 & 8
8	1.46	1.45	0.03	0.17	0.47	0.28	0.26	0.14 + 0.18	5 & 5
9	1.76	1.64	0.03	0.18	0.52	0.33	0.31	0.16 + 0.18	8 & 10
10	1.84	1.73	0.03	0.18	0.55	0.35	0.33	0.17 + 0.19	8 & 10

1 (holotype)-3, from *Astragalus monspessulanus* L., Andon, dépt. Alpes Maritimes, France, 14 October 1959; 4-6, from *Astragalus* sp., 2 km S. of Andon, 27 September 1959; 7-8, from *Astragalus* sp., 6 km E. of Valensole, dépt. Basses Alpes, 8 October 1959; 9-10, from *Astragalus monspessulanus*, Andon, dépt. Alpes Maritimes, 31 October 1959.

Alate viviparous female.

Morphological characters. — Much like apterous viviparous female, but the hair-bearing plates even darker, all smaller, the pleural ones considerably smaller than the spinal ones and plates bearing accessory hairs not numerous, only on fifth tergite fairly regularly present. Longest hairs on third abdominal tergite only about 0.016 to 0.035 mm long. No trace of ventral sclerotisation present. Number of rhinaria slightly higher than in apterae, about 8-14, and covering about $\frac{1}{2}$ to $\frac{2}{3}$ of the length of the segment. Veins in the wings dark but hardly bordered except distal $\frac{1}{3}$ part of the basal vein in the fore wings.

Colour. — Notes lost.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.81	1.69	0.03	0.20	0.53	0.35	0.33	0.15 + 0.19	10 & 11
2	1.85	1.66	0.03	0.19	0.52	0.33	0.33	0.16 + 0.18	9 & 10
3	1.93	1.72	0.03	0.21	0.53	0.33	0.36	0.17 + 0.19	10 & 11
4	1.70	1.60	0.03	0.17	0.50	0.32	0.30	0.16 + 0.18	10 & 13
5	1.98	1.80	0.03	0.19	0.56	0.39	0.35	0.17 + 0.18	10 & 11

1-2, from *Astragalus monspessulanus* L., Andon, dépt. Alpes Maritimes, France, 14 October 1959; 3-4, from *Astragalus* sp., 2 km S. of Andon, 27 September 1959; 5, as 1-2, but 31 October 1959.

Larvae.

First instar larvae with dorsal hairs on blackish plates, with only spinal and marginal hairs present; on fifth and seventh tergites spinal hairs at

mutually much greater distances, on third tergite at not much greater than normal mutual distance. Spinal hairs on first abdominal tergite hardly or not longer than their maximum width, only about 0.010 mm long, but caudad spinal hairs gradually longer (on fifth tergite about 0.030 mm) and more rod-shaped.

Notes. — This aphid was not discovered until the end of September and then studied till the beginning of November. It was only found on *Astragalus monspessulanus* L. and an unidentified *Astragalus* sp., perhaps the same species, in the area of Andon, dépt. Alpes Maritimes, at about 1070 m above sea level, and near Valensole, dépt. Basses Alpes, at about 570 m above sea level. Although many specimens were collected, no sexuales were observed.

It is with considerable reluctance that we describe this material as a new subspecies. But in the area much collecting of "normal" *T. trifolii* has been done at different altitudes and on several known and new host plants. If only material near Andon had been taken, we would have preferred to consider the specimens part of a particularly short-haired clone. But the fact that 35 km westwards in this mountaineous area indistinguishably similar specimens were once more encountered, again only on *Astragalus* (*monspessulanus* L.?) makes it rather certain that subsp. *brevipilosa* represents a special taxon, associated with *Astragalus* and probably restricted to that host. Unfortunately no transfer tests could be made as no microscopical study of the material was made until the second author had departed from the district where the aphids were found.

Morphologically the aphids differ from all other *T. trifolii* at hand by their short thick hairs which especially in the apterae are very conspicuous. In the embryos and the numerous first instar larvae that we have, the shortness of the hairs is even more marked. Specimens with similarly dark sclerotisation are available from The Netherlands (an old ovipara, collected in late autumn from *Trifolium arvense* L.) and from Iran (taken in early summer on *Onobrychis sativa* L.), but both have considerably longer hairs. The rostrum in all specimens of the subspecies is just shorter, especially as to its last segment, than in available specimens of the main species of comparable size of body. Evidently more work on this subspecies is required and its area of distribution should be studied in relation to that of its host plant.

Types. — Holotype: apterous viviparous female from *Astragalus monspessulanus* L., Andon, dépt. Alpes Maritimes, France, 14 October 1959, in the collection of D. Hille Ris Lambers. Paratypes: 51 apterous viviparous

females and 36 alate viviparous females, data as for holotype; 13 apterous viviparous females and 6 alate viviparous females, same plant and place as for holotype, but 31 October 1959; 13 apterous viviparous females and 8 alate viviparous females from *Astragalus* sp., 2 km S. of Andon, 27 September 1959; 2 apterous viviparous females from *Astragalus* sp., 6 km E. of Valensole, dépt. Basses Alpes, 8 October 1959; 1 apterous viviparous female from *Astragalus monspessulanus*, 6 km N.E. of Valensole, dépt. Basses Alpes, 1 November 1959.

Subgenus **Rhizoberlesia** del Guercio, 1915

Rhizoberlesia, originally described as a genus, has as type *Rhizoberlesia trifolii* del Guercio, 1915. Börner (1930) referred to the genus as *Rhizoberlesea* and later authors (Quednau, 1954; Pintera, 1957; Ossiannilsson, 1959) have followed Börner's spelling.

As Ossiannilsson (1959) has pointed out, *R. trifolii* del Guercio, 1915, requires a new name if *Rhizoberlesia* is made a synonym of *Therioaphis* Walker, since *R. trifolii* del Guercio, 1915, then becomes a junior homonym of *T. trifolii* Monell, 1882. But Ossiannilsson has refrained from renaming *R. trifolii* del Guercio and so do we. Instead we describe a new species, *Rhizoberlesia brachytricha* nov. spec., which may, or may not be the same as *Rhizoberlesia trifolii* described by Del Guercio (1915), but which certainly is the *Rhizoberlesea trifolii* of Quednau (1954), Pintera (1957) and Ossiannilsson (1959).

Therioaphis (Rhizoberlesia) brachytricha nov. spec.

Apterous viviparous female.

Morphological characters. — Body about 1.30 to 2.00 mm long, rather broadly pyriform. Head and pronotum rather uniformly very faintly pigmented, nearly smooth; mesonotum with two large medially nearly touching spino-pleural plates and large marginal plates all of which on their posterior margins are usually darker bordered; metanotum and abdominal tergites basically each with a number of more or less rectangular, conspicuously scabrously imbricated, convex sclerotic plates; marginal plates roundish; spinal plates the largest and more or less rectangular, not mutually touching on the median line, generally more or less completely fused with smaller pleural plates, the latter usually not fused with much smaller submarginal or pleuro-marginal plates; pigmentation of sclerotic plates variable, from almost colourless with dusky borders to rather evenly dusky, with the borders a little darker to brownish. All dorsal hairs inconspicuous, often very hard to find, very small, only about 0.007 to 0.010 mm long, blunt or with slightly

incrassate apices, numerous, to that on each of the anterior abdominal tergites normally more than six hairs are present, on normal, small sockets and not on conical processi, but on the head and on eighth abdominal tergite on very low tubercles. Front seemingly hairless, convex with typically irregular outline. Antennae, $\frac{5}{8}$ to $\frac{7}{9}$ of length of body, rather thick, pale with faintly darker apices of the segments of the flagellum, to rather dark; third segment with six (exceptionally four) to sixteen rhinaria that mostly are strongly transversely oval, but especially near base and apex sometimes nearly round, more or less in a row over basal $\frac{3}{5}$ to $\frac{8}{9}$ of the segment; processus terminalis generally shorter than base of sixth segment, usually shorter and only rarely just perceptibly longer than second joint of hind tarsi. Antennal hairs extremely scarce, very short. Rostrum not reaching middle coxae; last segment about $\frac{2}{3}$ of second joint of hind tarsi, with four to seven hairs besides the three subapical pairs. Siphunculi more or less semiglobular with flattened top, flangeless, pigmented like the nearest marginal sclerites. Cauda long, with a conspicuously elongated egg-shaped knob, which is about $1\frac{1}{2}$ times as long as its greatest width, with two long subapical hairs and nine to thirteen shorter and thinner hairs. Subanal plate deeply bilobed. Legs rather stout, uniformly pigmented like basal half of third antennal segment; first tarsal joints with two dorsal hairs, four long and one short ventral hair along distal margin and normally one more ventral hair more basad.

Colour. — Very pale buff to pale yellowish with the sclerotic areas smoky.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.45	1.06	0.02	0.20	0.35	0.17	0.19	0.12 + 0.11	8 & 10
2	1.53	1.03	0.02	0.20	0.32	0.17	0.18	0.13 + 0.11	7 & 7
3	1.64	1.10	0.02	0.21	0.34	0.19	0.19	0.13 + 0.11	10 & 10
4	1.37	0.94	0.02	0.19	0.32	0.14	0.16	0.11 + 0.10	8 & 9
5	1.66	1.17	0.02	0.22	0.37	0.20	0.21	0.14 + 0.12	8 & 12
6	1.81	1.31	0.02	0.24	0.47	0.17	0.25	0.17 + 0.12	13 & 14
7	1.68	1.33	0.02	0.23	0.45	0.23	0.25	0.14 + 0.12	12 & 12
8	1.89	1.42	0.02	0.23	0.48	0.27	0.26	0.14 + 0.14	12 & 12
9	1.95	1.47	0.02	0.26	0.48	0.29	0.26	0.16 + 0.14	13 & 13
10	1.40	1.13	0.02	0.20	0.38	0.18	0.20	0.12 + 0.11	4 & 13

All from *Lotus corniculatus* L.; 1-2, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 24 August 1959; 3 (holotype)-4, Cagnes, dépt. Alpes Maritimes, 30 August 1959; 5, Cap d'Antibes, dépt. Alpes Maritimes, 28 August 1959; 6, Uppsala, June 1959, leg. F. Ossianilsson; 7, Berlin, 17 July 1955, leg. W. Quednau; 8-9, 7 km E. of Tütlingen, 30 July 1960; 10, 9 km E. of Villach, 27 August 1960; 1-5, from France; 6, from Sweden; 7-9, from Germany; 10, from Austria.

Alate viviparous female.

Morphological characters. — Body mostly larger than in apterous vivipara of the same colony, about 1.45 to 2.05 mm long. Head pale with on underside a distinct brown bar connecting the anterior margins of the compound eyes; thorax pale, sometimes on mesonotum brownish; abdomen with basically the same sclerotisation as in apterous vivipara, but plates smaller and more transversely oval, mutually free, or merged to pairs of thin spinopleural bars, which first on fourth tergite, subsequently also on fifth, first and third tergites tend to coalesce medially; sclerotic areas considerably darker than in apterous vivipara, distinctly brown to rather deep brown, clouded, pale where a hair is implanted and there also slightly tuberculate. Antennae brown to blackish brown, paler on basal half of first segment and base of third segment; third segment with 8 to 18 rhinaria over $\frac{3}{4}$ to $\frac{9}{10}$ of the segment. Siphunculi more conical than in apterae. Legs brownish. Wings with normal *Therioaphis* venation, the veins thick, brown, broadly but very faintly bordered with brown. Other characters as in apterous viviparous female.

Colour. — Not noted.

Measurements in mm

No.	Length body	An- tenna	Siphun- culus	Cauda	Antennal segments				Rhinaria on III
					III	IV	V	VI	
1	1.58	1.14	0.02	0.19	0.35	0.21	0.21	0.13 + 0.11	14 & 14
2	.65	1.23	0.02	0.21	0.38	0.23	0.23	0.14 + 0.12	9 & 10
3	1.78	1.62	0.02	0.23	0.52	0.34	0.31	0.17 + 0.14	14 & 15
4	1.79	1.51	0.02	0.23	0.46	0.31	0.31	0.17 + 0.13	15 & 18
5	2.00	1.56	0.02	0.22	0.52	0.31	0.30	0.16 + 0.14	16 & 18

All from *Lotus corniculatus* L., 1-2, 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 24 Augustus 1959; 3, Södra Svealand, July 1959, leg. F. Ossiannilsson; 4, Fordespollen, 12 August 1958, leg. Mrs. H. Tambs-Lyche; 5, Berlin, 17 July 1955, leg. W. Quednau; 1-2, from France; 3, from Sweden; 4, from Norway; 5, from Germany.

Oviparous female.

Only damaged specimens available.

Morphological characters. — Sclerotisation as in apterous viviparous female. Spinal hairs on eighth abdominal tergite about twice as long as dorsal hairs on other segments, much longer than about eight additional ones on eighth tergite. Hind tibiae strongly swollen, not darker than other tibiae.

Alate male.

Only one damaged specimen available.

Morphological characters. — As in alate viviparous female, but abdominal

sclerites considerably smaller and also less numerous. Third antennal segment with 15 rhinaria, fourth with two, fifth with three rhinaria.

First instar larvae.

Described by Quednau (1954) and Pintera (1957).

Notes. — This species is locally common on the upperside of the leaves of tender growth of *Lotus corniculatus* L. growing on rather dry, warm spots. Alatae apparently are not always common, as in Southern France we found only few among great numbers of apterae viviparae. It has been recorded from Germany (Quednau, 1954), Czechoslovakia (Pintera, 1957) and Sweden (Ossiannilsson, 1959) as *Rhizoberlesea trifolii* del Guercio, but we are not convinced that the identification was correct.

Del Guercio (1915) described his *Rhizoberlesia trifolii* from the upper parts of the roots and from the crown of cultivated Red Clover, *Trifolium pratense* L. Ossiannilsson (1959) referred to a letter in which H. L. G. Stroyan stated that he found *Rhizoberlesea trifolii* (= *R. brachytricha* nov. spec.) in Sweden on *Trifolium pratense* L., but we never did find our aphid on this host although we found two *Therioaphis* species on it. The new species certainly does not feed on roots.

In the original description of *R. trifolii* del Guercio (1915) writes that the aptera is "a fondo verdastro, nerastro sul dorso, per fasce transversali, quasi confluyente" and his figure 6 on p. 245 shows such an aphid with uninterrupted broad bars across the segments. But the many specimens that we saw were certainly not greenish, and it is quite typical for the abdominal sclerotisation of apterae that both in life and in mounts it is remarkably pale, while the bars show on the middle of the dorsum a wide rift.

These parts of Del Guercio's descriptions, together with the host plant that he mentions — certainly not a case of misidentification — make us doubt whether *Rhizoberlesia trifolii* del Guercio, 1915, is really what later authors identified as this species. Because of this doubt we prefer to describe a new species rather than rename Del Guercio's.

Types. — All from *Lotus corniculatus* L., France. Holotype: apterous viviparous female, Cagnes, dépt. Alpes Maritimes, 30 August 1959; leg. R. van den Bosch and D. Hille Ris Lambers. Paratypes: 10 apterous viviparous females, data as for holotype; 12 apterous viviparous females and 2 alate viviparous females from 5 km N.E. of Vallauris, dépt. Alpes Maritimes, 24 August 1959; 12 apterous viviparous females and 1 alate viviparous female from Cap d'Antibes, dépt. Alpes Maritimes, 28 August 1959; 12 apterous viviparous females and 7 alate viviparous females from Grasse-Escagnolles, dépt. Alpes Maritimes, 17 September 1959; 8 apterous vivi-

parous females and 1 alate viviparous female from Comps, dépt. Var, 17 September 1959; 40 apterous viviparous females and 6 alate viviparous females from Lurs, dépt. Basses Alpes, 9 September 1959.

Further material: From Uppsala and Södra Svealand, Sweden, leg. F. Ossiannilsson; from Fordespollen and Aga, Norway, leg. Mrs. H. Tambs-Lyche; from Berlin, Germany, leg. W. Quednau, and Tütlingen, Germany, leg. R. van den Bosch; from Villach, Austria, leg. R. van den Bosch and D. Hille Ris Lambers.

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