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A note on some species of the genus *Diaspis* Costa, 1828, (Hemiptera, Coccoidea) in the Collections of the Naturhistorisches Museum in Vienna; with the description of a new species.

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(Mit 1 Textabbildung)

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The collections of the Coccoidea in the Naturhistorisches Museum in Vienna, — most of which are preserved in the dry state, — comprise the valuable original material of some species described and discussed by Signoret in his „Essai sur les Cochenilles" (1868—1877). I am very grateful to the Director, Professor Dr. Max Beier, for the loan of 13 samples of various *Diaspis* spp. from the collections (case No. 22), with permission to make the necessary microscopical preparations. Six of these samples were identified by Signoret and most of them referred to in his Essai Pt. 5 (1869); three were determined by Loew, and four had no specific identification. Except for one sample which consisted of a glass tube with the scales removed from the host, the specimens were preserved on parts of the host-plants pinned in the collection case. My primary intention was to locate Targioni-Tozzetti's original material of *Diaspis carueli* and *D. minima* for comparison with *D. juniperi* (Bouché); such material of *D. minima* was indeed found in the collections. It appears that Signoret and Loew based the recognition of these species on the host-plant considering *D. juniperi* (with *D. carueli* as its synonym) specific to *Juniperus* spp., and *D. minima* to the genera *Thuya*, *Cupressus*, etc.; hence some misidentification. Three samples contained more than one species, and the contents of one of them, the material of *D. ostreaeformis* of Signoret, clearly explains his confused description and misconception of Curtis's species. In two samples the identification of the host plant was found to be incorrect.

Altogether 10 species have been identified: *Abgrallaspis palmae* (Morgan & Cockerell, 1893); *Quadraspidiotus pyri* (Lichtenstein, 1881); *Pseudoparlatoria parlatorioides* (Comstock, 1883); *Epidiaspis leperii* (Signoret, 1869); 3 species of *Carulaspis*: *C. juniperi* (Bouché, 1851), *C. minima* (Targioni-Tozzetti, 1868) and *C. visci* (Schrank, 1781); and 3 species of *Diaspis*: *D. bromeliae* (Kerner, 1778), *D. coccois* (Lichtenstein, 1882), and a *Diaspis* sp. described here as new. The material of the new species was supplemented by three additional samples from the collections of the U.S. National Museum,

Washington D. C., for the loan of which I am very grateful to Dr. LOUISE M. RUSSEL. The identifications conform with the conceptions of the genera and species now generally accepted (FERRIS, 1937, 1941, 1942; BALACHOWSKY, 1948, 1950, 1954; BORCHSENIUS, 1950); the three species of *Carulaspis*, particularly the differences between *C. juniperi* and *C. visci*, have been defined by BORATYNSKI (1953, 1955, 1957), and later confirmed, supplemented and discussed by GOIDANICH (1962) and KAWECKI (1962).

The following samples, arranged according to their original labels in the collections, were examined:

1. *Diaspis boisduvalii* det. SIGNORET = *Diaspis bromeliae* (KERNER)
   Bilbergia pyramidalis, Pflanzenhaus.

A rather surprising misidentification; describing „*Diaspis boisduvalii* nobis" SIGNORET (1869:432) recorded orchids in the glasshouses of Luxembourg Gardens, Paris, as its hosts. Incidentally, this locality has sometimes been wrongly cited as „Luxembourg, Germany" (MCKENZIE, 1956:103)

2. *Diaspis carueli* det. SIGNORET = *Carulaspis juniperi* (BOUCHÉ)
   Juniperus sp., Washington.

Apparently a sample received from COMSTOCK and discussed in his Reports (1881: 310, 1883: 94). In the collections there are no specimens of TARGIONI-TOZZETTI (Orbitello, Florence — on *Juniperus phoenicea*) on which SIGNORET (1. c.: 436) based the description of *D. carueli* TARGIONI.

3. *Diaspis juniperi* det. SIGNORET = *Carulaspis minima* (TARG.-T.)
   Juniperus communis, Gallia centr.

Contrary to the opinion of TARGIONI-TOZZETTI, SIGNORET thought (1. c. 436—437) that *D. carueli* and *D. juniperi* were the same species, but treated them separately in the Essai (1. c.: 436, 437); the misidentification probably was influenced by the hostplant.

4. *Diaspis minima* det. SIGNORET = *Carulaspis minima* (TARG.-T.)
   Thuja occidentalis, Firenze, Italien.

There is little doubt that these are the specimens described by SIGNORET (1. c.: 438) and received from TARGIONI-TOZZETTI, who in his Catalogue (1868) listed on p. 45: "Sp. 4. *Diaspis minima* nob. n. sp. (*Thuja accidentalis* cupressique fastigiatae ramulis, incola)". Thus the sample represents a part of the type material, perhaps the only one now in existence. According to a kind communication from Dr. Giulia DELFA of the Museo Civico di Storia Naturale in Genoa, based on information from the Assistant of the Stazione Entomologia Agraria, Florence, "the types of Coccidae described by TARGIONI-TOZZETTI" are "not to be found in Florence" and "evidently were among material destroyed during the war" (in litt., March, 1956). The nomenclatorial status of *D. minima* and *D. carueli* was discussed by BORATYNSKI (1957: 246).

5. *Diaspis minima* det. SIGNORET = *Carulaspis minima* (TARG.-TOZZ.)
   Thuja occidentalis, Firenze, Italien. = *Thuya orientalis* LINN.

The original identification of the host was kindly checked by the specialists

in the Botany Department of the Naturhistorisches Museum in Vienna and was found to be erroneous. The locality of this sample would suggest that it was also received from TARGIONI-TOZZETTI.

6. *Diaspis ostreaeformis* det. SIGNORET = 1. *Epidiaspis leperii* (SIGNORET)
Pirus communis, Vichy, Gallia centr. 2. *Quadraspidiotus pyri* (LICHTENSTEIN)

A mixture of separate scales of the two species in a glass tube which evidently represent the material on which SIGNORET (1. c.: 439) based the description of "*Diaspis ostreaeformis Curtis*". SIGNORET observed frequent association of this "species" with *Mytilaspis pomorum* on pears, obviously being unaware that not one but another two species are involved. His description of the female refers to *E. leperii*, the similarity to which had been noticed by SIGNORET himself (1. c.: 438) and the synonymy of *E. leperii* and *D. ostreaeformis* SIGN. (nec Curtis) is now generally accepted (LINDINGER, 1912; FERRIS, 1937; LUPO, 1938; BALACHOWSKY, 1954; BORCHSENIUS, 1966). It is obvious now that SIGNORET's description and observations on the male puparia, which contained only pupae, refer to *Quadraspidiotus pyri*, several females of which have been mounted from this material. SIGNORET noted the perplexing similarity of these puparia to those of *Aspidiotus tiliae* BOUCHÉ and *A. spurcatus* SIGN., the identity of which does not seem to be settled yet. NEWSTEAD (1902), FERNALD (1903) and some other authors considered them synonymous with *Q. ostreaeformis* (CURTIS), whereas BALACHOWSKY (1948) suggested that possibly *Q. gigas* (THIEM & GERNECK) may also be involved. Having no adult males in his material SIGNORET included in his description of the "species" a direct translation of CURTIS' description of the male which, of course, refers to *Q. ostreaeformis* (CURTIS).

7. *Diaspis* sp. = *Epidiaspis leperii* (SIGNORET)
Mespilus germanica, Mentone, Gallia merid.

The locality would suggest that this sample was also a part of SIGNORET's collection, but when describing *D. leperii*, SIGNORET (1. c.: 437) recorded only peaches as its hosts.

8.—10. These three samples were determined by LOEW as: 8. *Diaspis juniperi* (BOUCHÉ), on *Juniperus communis*, Bisamberg, Austria; 9. *D. minima* T.-T., on *Cupressus sempervirens*, Wien; and 10. *D. minima* T.-T., on *Thuja plicata*, Wien, but in fact all three represent one species
= *Carulaspis juniperi* (BOUCHÉ)

11. Diaspididae = *Carulaspis visci* (SCHRANK)
Viscum (*album* L.), Steinkogel, Stadtwald, Rosaliengebirge; coll. HUBER, 1926.

12. *Diaspis* sp. = 1. *Diaspis coccois* LICHTENSTEIN
Bahamas, N. America 2. *Abgrallaspis palmae* (MORG. & CKLL.)

Saccharum officinarum = *Cocos nucifera* LINN.

The coccid population found in this sample made the identification of the

hostplant (2 fragments of leaf with scales) doubtful. I am grateful to Dr. C. R. METCALFE, Director of the Jodrell Laboratory at the Royal Botanic Gardens, Kew, for identifying the host on the basis of its microscopical structure which "shows quite clearly that the material consists of a pinna from a leaf of the Coconut Palm, *Cocos nucifera*" (in litt., 3. 8. 1967). Apart from a small admixture of *A. palmae* (one adult female recovered and mounted), the sample contains apparently young and fully grown females referable to *D. coccois* whose status as a separate species is at present provisionally accepted (FERRIS, 1937; BALACHOWSKY, 1954). It is defined as a simplified form of *D. boisduvalii* living on palms, and having no thoracic tubercles and no submedian dorsal ducts on the pygidium (BALACHOWSKY, l. c.: 182). Five of the seven females mounted and examined agreed with this definition; in the remaining two, some submedian ducts on the pygidium were present, and the thoracic tubercles were small but distinct in one, and rudimentary in the other. All specimens differed from the typical *D. boisduvalii* by their smaller size, and by the reduced although variable numbers of ducts, gland spines and derm pores. Fully grown females (with eggs) from 0,4 to 0,65 mm long. The total number of dorsal ducts on each side on both the pygidium and the prepygidial segments together varied from 13 to 36 ducts. Gland spines: 1—3 spines on 2nd abdominal segment; 3—4 on 3rd; 3—4 on 4th; and 2—3 spines on 5th segment. Anterior spiracles with only 2—4 pores. Perivulvar pores: median group with 0—12 pores; lateral anterior with 9—12; and the lateral posterior group with 2—17 pores. The median lobes appeared to be more widely separated, and the spur on the 4th segment stouter than in the typical *D. boisduvalii*.

13. *Diaspis* sp.	= 1. *Diaspis* sp. n.
Jodina rhombifolia HOOK.	2. *Pseudoparlatoria parlatorioides* (COMST.)
Uruguay, Amer. merid.	

The sample consisted of two leaves with scales; one leaf with a cluster of female scales and the other with a crowded cluster of mostly empty male puparia. Among the latter there were a few female scales and male puparia of *P. parlatorioides*, which at first were overlooked, but one female scale has been recovered, mounted and identified.

The three samples of the material from the collections of the U. S. National Museum consisted of specimens mounted on slides as well as of some dry scales removed from the host. Curiously enough the dry material also contained some scales of what is probably the same species of *Pseudoparlatoria*, but no adult females have been recovered to make the specific identification possible.

Diaspis iodinae spec. nov. (Fig. 1)

Synonymy: (?) *Diaspis boisduvalii* SIGNORET: HAYWARD, 1942: 42.

Habitat and scales (Fig. A.): Scales in clusters on the underside of leaves of *Iodina rhombifolia* HOOK & ARN. (Santalaceae). In the material from Vienna collections the female scales and male puparia are on different leaves,

but traces of the male puparia on the surface of some female scales in the material from the Washington collections would suggest that both sexes may occur together. Female scales flat, subcircular or oval, 1,6—1,9 mm in diameter, radially wrinkled; semitranslucent, dirty white, with a wide, yellowish-brown submarginal zone, but some scales with little brown coloration; larval exuvia subcentral, light brown. Male puparia elongate, narrow, about 1,2 mm long, distinctly tricarinate, with yellowish nymphal exuvia at the anterior end.

Adult female (Figs. D, E, F, G): Body immediately after moulting subcircular, or broadly pyriform, about 0,7 mm long and wide; when fully grown usually turbinate, up to 1,35 mm long and 1,2 mm wide at cephalothorax, with more or less distinct median depression at the anterior end. Derm membraneous except pygidium. Thoracic tubercles poorly developed or not at all, but marked by a small button-like disc surrounded by the derm with delicate circular pattern. The margins of the prepygidial abdominal segments protruding to variable degree; submarginal bosses on 1st and 3rd abdominal segments usually distinct. Antennae with one long, and often with another short setae, sometimes the single long seta split longitudinally at base; also with 2—3 coeloconic sensilla. Labium conical, short. Anterior spiracles with 2—3 derm pores, posterior with none. Anal opening ovoid, relatively large, at the level of about $^1/_5$th apical part of pygidium. Vulva at about ½ length of pygidium. Pygidium (Figs. E, F, G): with 3 pairs of well developed lobes. Median lobes (L 1) usually very narrow, as wide as, or slightly more, though occasionally about 1,5 times wider than the inner lobule of L 2, not projecting beyond the level of the latter; separated at base by about the width of the lobe, strongly diverging, with the inner margin serrate. L 2 deeply bilobed, both lobules rounded apically, sometimes with slightly slanting outer margins; the outer lobule shorter and a little narrower. L 3 bilobed, the lobules wider than those of L 2, with distinctly sloping outer margins, the outer lobule wider than the inner one. L 4 marked by distinct marginal sclerotization. The spur on the 4th segment stout, about as long as wide at base, with pointed apex. Glandular spines on the pygidium in the usual pattern, one each on segments 6 to 8, and two on 5th; prepygidial segments with variable number of spines: 2nd segment with 2—4 (usually 3) spines; 3rd with 4—8 (5—6); and the 4th with 4—6 (usually 5) spines; each spine with a long and narrow microduct. Ducts: Large marginal macroducts in the usual *Diaspis* pattern, one between the median lobes and six on each side of the pygidium; the latter open on the projecting marginal processes which are particularly well developed between L1 and L2, where they often resemble in form and size the lobules of L2. Two similar macroducts occur on each side of the dorsal surface of the pygidium, one each opposite the inner lobules of L2 and L3. Smaller dorsal macroducts on pygidium numerous: one duct near the anal opening; one or two in a longitudinal row on 7th segment; 6—11 (usually 8—9) in an irregular row on 6th; and 14—22 (usually about 20) in an irregular band on 5th segment; 1—3 ducts in the submedian area of the 5th segment sometimes present on one

or on both sides of the pygidium. The submarginal dorsal series of these ducts extends anteriorly over all prepygidial segments and usually also over metathorax; the ducts numerous, crowded over the whole submarginal dorsal area of the segments, the anterior segments each often with the ducts arranged into the anterior and posterior bands or clusters, separated more or less distinctly by a bare strip of derm at the level of the corresponding marginal segmental seta. The number of ducts varies both individually and on the two sides of the same specimen: 25—40 (usually about 30) ducts on 4th segment; 31—41 (30—35) on 3rd; 22—51 (25—30) on 2nd; 2—74 (25—35) on 1st; and 0—22 (5—8) ducts on metathorax. Occasionally one or two ducts may be found on mesothorax, or even on prothorax. Microducts frequently occur among macroducts, particularly on metathorax and on 1st abdominal segment, apparently replacing to greater or lesser degree the macroducts; one or two of these microducts in the marginal area may open on the apex of a small conical tubercle, the majority however have a small circular opening at the level of the derm. Identical (non-tuberculate) microducts occur on the dorsal surface of the prosoma: a loose cluster on the submarginal area of the mesothorax, and three more or less well defined groups or bands, one each on the 1st abdominal segment, meta- and mesothorax, sometimes also with a few microducts on prothorax; the number of microducts in all these groups varies considerably, e. g. the submedian mesothoracic band may comprise from 2 to 20 ducts, but occasionally none. On the ventral side of the body similar microducts occur: in small groups around and between the posterior spiracles; singly on the submedian and sublateral areas of the prepygidial segments; and in three rows of 1—3 ducts each, one row each on the 5th, 6th and 7th segments of the pygidium. Perivulvar pores in 5 groups, frequently the anterior lateral group with one to three small satellite clusters on one or on both sides of the pygidium; the number of pores in the groups variable: median anterior with 11—27 (usually 12—15) pores; lateral anterior with 9—35 (23—26); and the lateral posterior with 2—24 (16—18) pores. The distribution of the body setae, illustrated in Fig. D, conforms with the general *Diaspis* pattern.

2nd instar female (Fig. C): Young specimens ovoid, about 0,4 mm long; when fully grown broadly pyriform, about 0,7 mm long and as wide or wider at cephalothorax. L1 and L2 well developed, similar to those of the adult female, often protruding and forming on each side a distinct, posteriorly taper-

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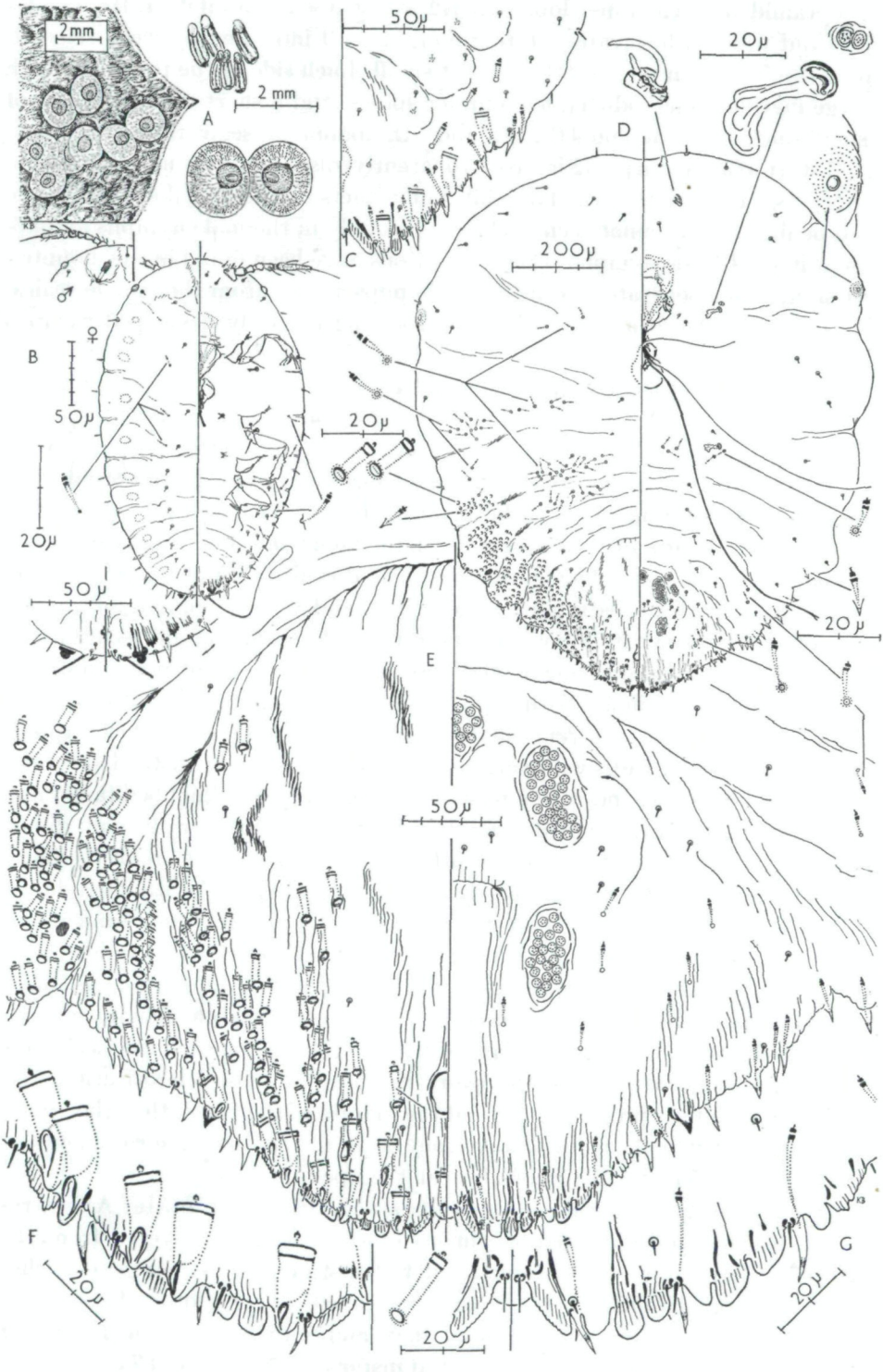
Fig. 1. *Diaspis iodinae* n. sp.: A Male puparia and female scales, with the female scales "in situ" on the underside of the leaf of *Iodina rhombifolia*. B. 1st instar nymph: complete female nymph, dorsal and ventral views, and the dorsal view of anterior part of male nymph with the bitubular duct. C. 2nd instar female nymph: posterior part of the body, ventral view. D. Adult female, complete; dorsal and ventral views. E. ditto, pygidium, dorsal and ventral views. F. and G. ditto, marginal details of the pygidium, dorsal and ventral views, respectively. The illustration of the adult female is based on the holotype and shows the anterior lateral group of perivulvar pores with two satellite clusters, and 2 submedian ducts on the 5th segment on one side but not on the other.



ing pyramid with the inner lobule of L2 at the apex. L3 bilobed, the lobules short and wide with serrate, slanting margins; L4 indicated by week sclerotization, and the spur on the 4th segment small. Each side of the pygidium with 4 large marginal macroducts, 6 glandular spines, and a short sublateral row of 3 small ducts, one each on 4th, 5th and 6th abdominal segments.

1st instar nymph (Fig. B). Apparently displaying an unusual sexual dimorphism namely that the large bitubular ducts on the dorsal surface of the head behind the antennae seem to be present only in the male nymphs and are absent in the female nymphs. These conditions have been found in the mounted cast skins taken separately from the male puparia and from the female scales, respectively; both forms were also found among the fully developed nymphs within the body of several adult females. In *Epidiaspis leperii* these glands are present in both sexes (GEIER, 1949, and my own observations), and Ferris (1937, 1942), who described and illustrated them in a number of species, considered their presence diagnostic of Diaspidini. The matter requires, however, detailed investigation on better and more representative material. The other characters are identical in both sexes. Body elongate oval, at eclosion about 0,2 mm long and 0,12 mm wide; later about 0,3 mm long and almost circular, particularly the female nymphs. The dorsal derm of young crawlers dense, with a pattern resembling fingerprints, and with a submarginal dorsal series of oval, somewhat embossed darker areas along the margin. Antennae 6-segmented, the apical segment relatively short, wrinkled but not annulated. Eyes marginal, distinct. Mouthparts comparatively large, with broadly conical labium. Spiracles very small, with thin bar; anterior spiracles apparently without pores. Legs with very short tibia, long, apically distended tarsus, slender and long claw, and with a pair each of long, apically knobbed tarsal and claw digitules. Posterior end of the body with a median pair of small, diverging membranous tubercles; apical setae long, about $^3/_4$ or more of the body length. On each side 3—4 progressively smaller gland spines with microducts, the series extending anteriorly over all abdominal segments, meta- and mesothorax as a submarginal ventral row of small microducts each of which opens on the tip of a minute tubercle near the corresponding intersegmental line. A longitudinal row of 3 similar microducts occurs on the submedian dorsal area of the cephalothorax. Ventral surface of the „pygidium" on each side with four sclerotizations arranged in two pairs; the median-most sclerotization well developed, lobe-like, projecting beyond the margin of the body; the other three rudimentary, gradually fading away; they seem to represent the rudiments of L2 and L3. Anal opening dorsal, near the apex, minute.

The second instar male, prepupa and the adult male: A few, rather incomplete and distorted specimens of these stages recovered from the material at hand were not suitable for detailed studies, but their general characters conformed well with the conditions known in some other Diaspidina. The conditions of the marginal pygidial ducts and of the lobes of the 2nd instar male were very similar to those of the 2nd instar male nymph of *Carulaspis* sp.

(= *juniperi*) (BORATYNSKI, 1953: 468); the development of the postoccipital and midcranial ridges of the adult male resembled those of *D. boisduvalii* and *Carulaspis* spp. (GHAURI, 1962: 130—147).

The material examined: Female and male scales on 2 leaves of *Iodina rhombifolia*: Uruguay, Amer. merid., in the collections of the Naturhistorisches Museum in Vienna: 16 mounted females including the holotype. The material from the Collections of the U. S. National Museum, on the same host and included in the type series: Colonia Suiza, Uruguay, coll. H. L. PARKER, 7. 9. 1947, —1 slide with 6 females; MANFREDI Exp. Sta., Argentina, 18. 9. 1956, — 1 slide with 5 females; Cordoba, Argentina, coll. O. C. MOLINARI, 15.5.1945, — 1 slide with 4 females, and 18 females mounted from the dry material. The holotype with 15 paratypes deposited in the Nat.-Hist. Museum in Vienna; the other paratypes in U. S. National Museum, Washington D. C., and in the British Museum (Nat. Hist.), London.

The description of the adult female is based on the holotype and 49 paratypes selected from the material of both, the Vienna and the Washington collections; and the illustration (Figs. D, E, F, G) are based entirely on the holotype drawn as accurately as possible using camera lucida.

Note: *Diaspis iodinae* n. sp. is closely related to *D. boisduvalii* SIGN. and *D. miranda* (CKLL.), but differs from both by the large number and the distribution of submarginal dorsal macroducts, position of the anal opening, nontuberculate prosomatic micropores, small number of paraspiracular pores, as well as by the details of pygidial structures; the scales of the female are also distinctive. *D. boisduvalii* SIGN., reported by HAYWARD (1942: 42) from Tucuman, Argentina, on *Iodina rhombifolia* probably is referable to this species.

Pseudoparlatoria CKLL., 1892

Having a mixed sample of *D. iodinae* and a *Pseudoparlatoria* sp., some observations have been made on the characters of the stages other than the adult female distinguishing the two species. The 1st instar nymphs of *Pseudparlatoria* clearly differ from those of *D. iodinae* by having only 5-segmented antennae with the 5th segment relatively long and annulated, and their „pygidium" shows rudiments of the median lobes as well as those of L2 and L3. The latter condition resembles that of the 1st instar nymphs of *Lepidosaphes* spp. (unpublished observations). A few specimens of the male series, imperfect as they were, showed similar affinities; the conditions of the marginal macroducts and lobes of the pygidium of the 2nd instar male resembled that of *Lepidosaphes ulmi* (BORATYNSKI, 1953: 466), and the conditions of the postoccipital and midcranial ridges of the adult male appeared to be more like those of *Lepidosaphes* spp. than *Diaspis* spp. or *Carulaspis* spp. (GHAURI, 1962: 130—147). Thus, it would appear that this genus belongs to the subtribe *Lepidosaphedina*. BALACHOWSKY (1954) assigned the genus *Pseudoparlatoria*

to the group Diaspiformes of the subtribe *Diaspidina*, as a somewhat aberrant genus, the females of which have a pair of somewhat modified glandular spines between the median lobes.

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