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NOTES ON THE DUTCH ARMADILLIDIIDAE,  
WITH DESCRIPTION OF ARMADILLIDIUM  
(DUPLOCARINATUM) ALBUM DOLLFUS  
(CRUSTACEA ISOPODA)

by

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With one textfigure

At present five species of Armadillidiidae, all belonging to the genus *Armadillidium* Brdt., are known from the Netherlands. These five species are *Armadillidium vulgare* (Latr.), *A. nasutum* B.-L., *A. opacum* (Koch), *A. album* Dollf., and *A. pulchellum* (Zenk.). The species will be dealt with in this order. Of every species, with the exception of *A. vulgare*, an enumeration is given here of the material present in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, the material collected in greenhouses excluded.

***Armadillidium* (*Armadillidium*) *vulgare* (Latreille)**

This species, which is known also under the name *Armadillidium cinereum* (Zenk.), is the most common species of the genus from the Netherlands. It may be found throughout our country, and is often met in the neighbourhood of human settlements. It is therefore of no use to give here a list of the abundant Dutch material of this species present in the Rijksmuseum van Natuurlijke Historie at Leiden.

***Armadillidium* (*Pseudosphaerium*) *nasutum* Budde-Lund**

Meerssen (southern part of the province Limburg); among *Marchantia*; June 10, 1927; leg. F. P. Koumans. — 24 specimens 4-11 mm.

The specimens mentioned above were already reported upon by Koumans (1928), they are the only representatives of the species found up till now in the Netherlands in the open. The species is rather common in several Dutch greenhouses. *Armadillidium nasutum* occurs in Central and Northwest Italy, in Spain, in the western part of France, in Southern England and in the Netherlands; it attains in our country the northern limit of its range of distribution in the open.

**Armadillidium (Pseudosphaerium) opacum (Koch)**

St. Pietersberg, near Maastricht (province Limburg); July 23, 1931; leg. F. P. Koumans.—5 specimens 7-10 mm.

Savelsbosch, Gronsveld (southern part of the province Limburg); July, 1932; leg. F. P. Koumans.—1 specimen 13 mm.

St. Geertruide (southern part of the province Limburg); July 23, 1931; leg. F. P. Koumans.—1 specimen 11 mm.

Onderste en Bovenste Bosch, Epen (southern part of the province Limburg); July 22, 1931; leg. F. P. Koumans.—1 specimen 7 mm.

Epen (southern part of the province Limburg); May 31, 1943; leg. W. Vervoort & L. B. Holthuis.—3 specimens 8-10 mm.

Schin op Geul (southern part of the province Limburg); July 13-22, 1944; leg. W. Vervoort.—1 specimen 10 mm.

Gulpen (southern part of the province Limburg); May 31, 1943; leg. W. Vervoort & L. B. Holthuis.—1 specimen 7 mm.

Eiserbosch, Eis (southern part of the province Limburg); July 28 and August 3, 1943; leg. W. Vervoort.—4 specimens 6-11 mm.

The present species, which is reported here for the first time from the Netherlands, is closely related with the previous species, from which it differs by having the frontal plate lower, the telson shorter and more truncate at the apex and by the shape of the first free thoracic segment. *Armadillidium opacum* shows to be rather common in the southern part of the province Limburg, but is at present not yet collected in the Netherlands outside that region.

**Armadillidium (Duplocarinatum) album Dollfus**

*Armadillidium album* Dollfus, 1887, Bull. Soc. Étud. sci. Paris, vol. 9, pp. 4, 7.

*Armadillidium album* Dollfus, 1892, Feuille. jeun. Nat., vol. 22, p. 179, fig. 26.

"an *Armadillidium*" Cummings, 1907, Zoologist, ser. 4 vol. 11, p. 469.

*Armadillidium album* Bagnall, 1908, Zoologist, ser. 4 vol. 12, p. 152.

*Armadillidium pulchellum* Koumans, 1928, Zool. Meded., vol. 11, p. 199, fig. E.

De Koog, North Sea shore of the Frisian Island of Tessel; under a basket on the beach; July 10, 1927; leg. H. F. de Fluiter.—11 specimens 6-9 mm.

De Slufter, North Sea shore of the Frisian Island of Tessel; burrowed in the sand of an old tidemark; June 22, 1937; leg. J. J. ter Pelkwijk.—12 specimens 5-8 mm.

Description: The anterior surface of the frontal triangular plate of the epistome is flat or slightly concave. The upper margin protrudes only slightly above the dorsal surface of the head, it is about straight. The lower lateral margins of the frontal triangle are sharply edged, concave; they meet under a sharp angle and unite to a sharp vertical ridge. Laterally the triangle continues beyond the eyes, so that it is visible in dorsal view as a narrow ridge, which extends all along the frontal margin of the head. This character indicates that the species, just like *Armadillidium pulchellum*, belongs to the subgenus *Duplocarinatum* Verhoeff. Between the

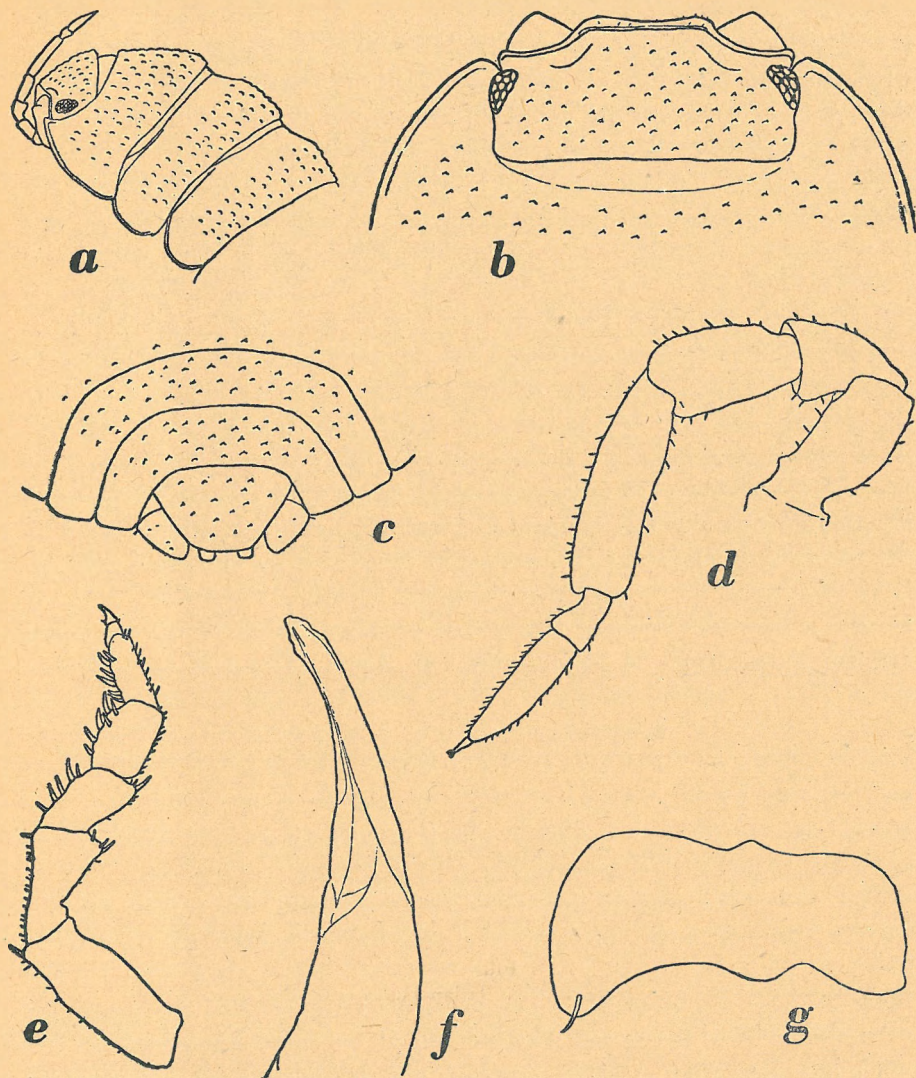


Fig. 1. *Armadillidium album* Dollf. a, anterior part of the body, lateral view; b, head, dorsal view; c, abdomen, dorsal view; d, antenna; e, 7th pereopod of male; f, endopod of first pleopod of male; g, exopod of first pleopod of male. a  $\times 13$ , b and c  $\times 27$ , d  $\times 56$ , e  $\times 28$ , f and g  $\times 67$ .

triangular plate and the head a very narrow fissure is present. Some short scattered hairs are placed on the upper margin of the triangle. The frontal line of the head is strongly curved backward from the base of the triangle, laterally it becomes inconspicuous. The eyes are distinct, they are provided

with black pigment and consist of about 12 to 15 ocelli. The antennal lobe of the head has the anterior margin bluntly angular. The antennae are rather short, they do not reach the end of the first free thoracic segment, when they are curved backward. The flagellum of the antenna consists of two joints, the ultimate of which is about thrice as long as the first. The upper surface of the head, of the thoracic and abdominal segments, as well as that of the telson is covered with numerous minute tubercles, which often are arranged in more or less distinct longitudinal rows. Each tubercle is provided at the top with a short stout seta. The epimerae of the segments are devoid of tubercles. The dorsal surface of the segments bears microscopical small, reticularly arranged grooves, which are most conspicuous at the epimerae. The first free thoracic segment has the anterior part of the epimera slightly curved upward; the posterolateral angle of the segment is somewhat produced and has the tip rounded, differing in this respect from *Armadillidium pulchellum*, in which species the posterolateral angle of the first free thoracic segment is truncate. The posterolateral angle of the following thoracic segments is broadly rounded in the anterior, becoming more rectangular in the posterior segments. The anterolateral angle of the second to fifth free thoracic segments is bluntly rounded, that of the sixth and seventh segment is rectangular. The lateral margin of the thoracic segments is somewhat thickened. The abdominal segments are about of equal length, the epimerae have their anterolateral as well as their posterolateral angles rectangular. The telson is distinctly broader than long and has the lateral margins straight or slightly convex; the posterior margin too is straight or slightly convex, while the posterolateral angles are bluntly rounded. The posterior margin of the uropodal exopod is slightly convex and is provided in the outer part with a small incision in which a hair or small spine is placed, which is distinctly stronger than the other hairs of the posterior margin. Some tubercles usually are present on the upper surface of the exopod. The endopods are short and often entirely concealed beneath the telson. The ischium of the seventh pereopod in the male has the lower margin straight and provided with several short spinules. Before the distal end the ischium rapidly broadens; on the apex of this broadened part it bears two spines, while a third spine is placed some distance before the other two. Some scattered hairs are present on the upper margin of the ischium. The merus, carpus and propodus each have the lower margin provided with some stout spines, while the upper margin bears some smaller spines or hairs; the merus is provided with a strong anterodorsal spine. The exopod of the first pleopod in the male is broadly leafshaped, the anterior margin is broadly rounded and the inner part of

the posterior margin ends in a blunt point, which in the only male specimen at my disposal bears a rather long movable spine; no other hairs or spines could be observed on the margin of the exopod. Dollfus's (1892) figure does not show such a movable spine on the posterior margin of the exopod in the male, while several hairs are visible there. The endopod of the first pleopod in the male is long and regularly curved outward; its apex is blunt and of an irregular shape.

Colour. Dollfus states his specimens to have a "Couleur blanc uniforme". Cummings's specimens too were coloured white; Bagnall, who examined Cummings's material stated that some of the animals had "the segments of the mesosome partially shaded with grey". The specimens at my disposal all are coloured yellowish white, some of them, however, show a faint irregular greyish-brown colourpattern in the median part of the thoracic and abdominal segments. But this colour is so vague that it brings no change at all in the general yellowish white impression, which one gets of the animals. Cummings's (1907) remark: "One out of the six I took was close approaching the normal grey colour of the *Armadillidia*." certainly does not fit for any of the specimens examined by me; probably Cummings's statement is a little exaggerated, as Bagnall, who examined Cummings's material does not say anything about such a dark specimen.

Biology. *Armadillidium album* is, as far as I know, found only on sandy seashores. Dollfus reports it from under stones and pieces of wood on the beach: "Plages de sable du Sud-Ouest [of France], sous les pierres et les pièces de bois." Cummings found his specimens "On the sands under seaweed, &c." The specimens from De Koog were found under a basket lying on the wet part of the beach. The material from De Slufter is accompanied by a note of the collector, which states that large numbers of the animals were burrowed in a rolled up condition in the sand of an old tidemark. This is the first time that the burrowing habit of the species is mentioned. In literature nothing is mentioned of the occurrence of ovigerous females. The material from De Koog consists of one male and 10 non-ovigerous females, while the specimens from De Slufter, all being females, for the larger part were bearing ova or newly hatched juveniles.

Distribution. As far as I can find in literature the species is known from three widely separated localities: Beach of Arcachon, southwestcoast of France (Dollfus, 1887, 1892), beach near Saint Ferdinand, Arcachon (Dollfus, 1892), mouth of the rivers Taw and Torridge near Barnstaple, northcoast of Devon (Cummings, 1907; Bagnall, 1908) and beach near De Koog, westcoast of Tessel (Koumans, 1928). The form described by Tua (1900) as *Armadillidium album* var. *marmoratus* from Val Salice near

Turin, to all probability does not belong to the present species. Dollfus's supposition that *Armadillidium album* perhaps is accidentally introduced, is distinctly disproved by the fact that it is found on two other points of the Atlantic coast of Europe.

Relation. Dollfus (1887, 1892) for the first time reported the species and described it as new; he does not mention, however, its relation to other species. In 1907 Cummings reported the species without being able to identify it. Bagnall (1908) after examination of Cummings's specimens showed them to be identical with Dollfus's species; he too does not mention the place of *Armadillidium album* among the other species of the genus. Koumans (1928), by lack of material for comparison, identified specimens from Tessel with *Armadillidium pulchellum*. *A. album* indeed is closely related to *A. pulchellum*, belonging even to the same subgenus, viz., *Duplocarinatum* Verhoeff (1931), which is characterized by the fact that the frontal triangle of the epistome in dorsal view is visible as a narrow ridge, which extends over the entire breadth of the head. The subgenus *Duplocarinatum* Verhoeff (1931) was considered by Verhoeff (1902) to be only a sectio of the subgenus *Armadillidium*, this sectio was called by him *Duplocarinatae*; in his (1931) work it is raised to the rank of a subgenus. Strouhal (1927) does not agree with Verhoeff's (1902) division of the subgenus *Armadillidium* s.l. and gives a new division in which that subgenus is divided into 16 groups. Strouhal's "*pulchellum*" and "*bicurvatum*" groups contain the same species as inserted by Verhoeff in his subgenus *Duplocarinatum*, as was already shown by Verhoeff (1931) himself. The "*bicurvatum*" group differs from the "*pulchellum*" group by having the dorsal surface of the segments provided with tubercles. *Armadillidium album* therefore belongs to Strouhal's "*bicurvatum*" group. As far as I know the following species belong to that group: *Armadillidium albigauni* Arcangeli, *A. album* Dollfus, *A. apfelbecki* Dollfus, *A. bicurvatum* Verhoeff, *A. justii* Strouhal, *A. kossuthi* Arcangeli, *A. schulzi* Strouhal with its variety *sinuosum* Strouhal. All species, with the exception of *A. album*, originate from Southern Europe; *A. albigauni* and *A. kossuthi* are recorded from Italy, *A. apfelbecki* from Dalmatia, the other species from Greece and the Grecian Islands.

#### ***Armadillidium (Duplocarinatum) pulchellum* (Zenker)**

Wood near Bokstel, about halfway between 's Hertogenbosch (Bois-le-Duc) and Eindhoven (province Noord-Brabant); in decaying wood of a dead treetrunk; August 4, 1945; leg. W. Vervoort.—4 specimens 4-5 mm.

Wood near Oorschot, about halfway between Tilburg and Eindhoven (province Noord-Brabant); between dead leaves; August 6, 1945; leg. W. Vervoort.—1 specimen 5 mm.

Wood near Esbeek, near the southern border of the Province Noord-Brabant, south of Tilburg; April 10-14, 1944; leg. W. Vervoort.—9 specimens 4-6 mm.

As already pointed out above, the specimens from Texel identified by Koumans (1928) as *Armadillidium pulchellum* do not belong to that species, but to *A. album*. Therefore the present specimens from Noord-Brabant are the first representatives of *A. pulchellum* reported from the Netherlands. The animals entirely agree with the descriptions and figures given in literature. The species differs from *Armadillidium album* by the smooth and shining dorsal surface of the segments, which, however, may bear some scattered small pits. Moreover the posterolateral angle of the first free thoracic segment is truncate. The colour of the specimens too is typical, as they are very dark greyish brown with irregular light spots. In fresh material furthermore conspicuous yellow patches are visible, which, however, soon disappear by the preservation in spirit.

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