

BIJDRAGEN TOT DE KENNIS DER FAUNA VAN CURAÇAO.  
Resultaten eener reis van Dr. C. J. VAN DER HORST in 1920.

ON A COLLECTION OF NON-MARINE MOLLUSCA  
FROM CURAÇAO

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(With 4 text-figures).

About ten years ago Dr. J. H. VERNHOUT, at that time curator at the National Museum of Natural History at Leiden, gave a commentary on the present state of our knowledge about the "Land- & Freshwater-Molluscs of the Dutch West-Indian Islands" (Notes Leyden Museum, Vol. XXXVI, pag. 177—189, 1914).

After summarising carefully the different species of every island in particular, he composed a survey in table-form representing their geographical distribution on other Antilles and on the continent.

The paper by M. M. SCHEPMAN (Encyclopedie van Nederlandsch West-Indië, Mollusca, pag. 480—481, 1914—1917) repeats in general these results.

Recently H. B. BAKER published a couple of reports on the fauna of the Dutch possessions in the Leeward Archipelago (The Mollusca collected by the University of Michigan-Williamson Expedition in Venezuela, Occ. Papers Mus. Zool. Univ. Michigan, n<sup>o</sup> 137, 1923; New Land Operculates from the Dutch Leeward Islands, The Nautilus, Vol. XXXVII, 1924; Land- and Freshwater Molluscs of the Dutch Leeward Islands, Occ. Papers Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924).

To these papers I shall have to refer repeatedly.

In the following lines a brief account is given of the collections recently made by Dr. C. J. VAN DER HORST of Amsterdam and by Mr. G. J. H. MOLENGRAAFF, engineer of the Geological Survey of Curaçao. I added also the non-marine molluscs from this same island contained in the collection of the Zoological Museum of Amsterdam.

*Drymaeus elongatus* (Bolten).

Hato 1923, numerous spec.  
Entrance to Spanish Water, 2 spec.  
Curaçao, 2 spec.

*Cerion uva* (Linné).

Near Caracasbay 1920, 185 spec.  
Curaçao, 2 spec.  
Entrance to Spanish Water, numerous spec.  
Hato, 11 spec.  
Curaçao, 28 spec.

The specimens from the entrance of Spanish Water are for the greater part young animals with only about 4—6 whorls representing *Helix pentodon* Menke (PFEIFFER, Conch. Cabinet 2nd ed. pag. 198, pl. C, and SMITH, Proc. Malac. Soc. London, Vol. III, 1898, pag. 113—116). Those of Caracasbay represent an extremely varied company in size, sculpture and number of whorls. In H. B. BAKER's latest paper (Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 98 ff.) we find an interesting

discussion of the variation of *Cerion uva* and the correlation between average height and number of turns. After the examination of more than 2700 specimens the author feels inclined to ascribe the different features only to the influence of ecological conditions: "The size of the shells (i. e. the diameter) appears to be directly dependent on the richness of the habitat. . . . The number of whorls (and the altitude) appears to be inversely proportional to the amount of exposure to the dry trade-winds" etc.

Consequently the names *diablensis* created for "the most dwarfed shells" and *hatoensis* given to the biggest individuals with the heaviest sculpture, only denote the extreme limits of variation connected by series of intermediate stages.

In his "Rapport betreffende een voorloopig onderzoek naar den toestand van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao" ('s Gravenhage, 1907) Dr. J. BOEKE mentions on page 143 how *Cerion uva* was formerly exported in large quantities to Germany as turkey-food, and therefore the natives call these shells: "kokoliesjie di kalakoena". At the present time this trade has considerably decreased in importance.

*Brachypodella raveni* (Crosse).

*Cylindrella raveni* CROSSE, Journ. de Conchyl. Vol. XX, 1872, pag. 157—158 and Vol. XXI, 1873, pag. 40—41, pl. I, fig. 4.

*Brachypodella raveni raveni* and id. id. *sanctae barbarae* H. B. BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n° 152, 1924, pag. 90—92, pl. XVI, fig. 65, pl. XVII, fig. 67, 68 and 73.

Tafelberg, 23. I. 85, 6 spec.

Near well Bak Ariba, Hato, 19. IX. 23, 1 spec.

Plantation Plantersrust, 24. IX. 23, numerous spec.

This last set consists of several immature shells still possessing their initial whorls which are generally lost at more advanced age. Plantation Plantersrust, situated north of Schottegat, and Tafelberg near Santa Barbara being only at a short distance from each other, it is easily to be understood that I have not succeeded to distinguish BAKER's subspecies *raveni* and *sanctae barbarae* among the shells at my disposal. Those of Plantersrust and of Tafelberg practically agree and may be ranked among *sanctae barbarae*. I wish to exclude from this discussion the only specimen collected at Hato as it is badly worn and in a poor condition.

*Microceramus bonairensis* subsp. *curaçaoana* H. B. Baker.

*Pineria Bonairensis* E. A. SMITH, Proc. Malac. Soc. London, Vol. III, 1898, pag. 114, fig. 1.

*Microceramus bonairensis* subsp. *curaçaoana* H. B. BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n° 137, 1923, pag. 6—7, pl. I, fig. 4 and 5; ibid. n° 152, 1924, pag. 96—97, pl. XVII, fig. 75—76.

Hato, 2 spec.

Plantation Plantersrust, 24. IX. 23, 37 spec.

Near well Cajoeda, 1923, 1 spec.

The specimens of Curaçao being a trifle larger than the only shell of Bonaire described by SMITH in 1898 have therefore been distinguished by BAKER as the subspecies *curaçaoana*. Mr. MOLENGRAAFF collected a large series, many specimens of which again surpass BAKER's indications of size, reaching even 11 mm. height in a few shells.

According to the composition of the radula this species, originally described by SMITH as a *Pineria*, should be ranked among *Microceramus*, as PILSBRY already suggested (The Nautilus, Vol. XVII, 1903, pag. 48), but this could not be decided at that time as no living animals were known.

*Leptinaria gloynii* (Gibbons).

*Cionella gloynii* GIBBONS, Journ. of Conch. Vol. II, 1879, pag. 135, pl. I, fig. 1.

*Neosubulina gloynii* H. B. BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n° 152, 1924, pag. 88—89, pl. XVI, figs. 59 and 62.

Plantation Plantersrust, 20. IX. 23, numerous spec.

The highest shell of the material from Plantersrust and four others which nearly approach it in their dimensions, measure:

	altitude (in mm.)	number of whorls		altitude (in mm.)	number of whorls
1	15	11 $\frac{1}{4}$	4	11 $\frac{1}{2}$	9
2	13 $\frac{1}{4}$	10	5	10 $\frac{1}{2}$	8 $\frac{3}{4}$
3	12	9			

*Opeas gracile* (Hutton).

Hato, 1922, 3 spec.

Plantation Plantersrust, 20. IX. 23, numerous spec.

Though frequently recorded from several West-Indian islands in the vicinity of Curaçao, these are the first sets from our main Antillean colony itself.

*Pupa (Pupoides) marginata* (Say).*Cyclostoma marginata* SAY, Journ. Ac. Nat. Sci. Philadelphia, Vol. II, 1821, pag. 172.*Pupa fallax* VERNHOUT, Notes Leyden Museum, Vol. XXXVI, 1914, pag. 179.*Pupoides marginatus* PILSBRY, Man. Conch., Vol. XXVI, 1921, pag. 111—113, pl. XII, fig. 1—7.

Plantation Plantersrust, 20. IX. 23, numerous spec.

Near well Bak Ariba, Hato, 19. IX. 23, 5 spec.

Curaçao, Hato, 13. I. 85, 20 spec.

Hato, 4 spec.

According to PILSBRY (l. c. pag. 113) "this shell has usually been known as *Pupa fallax* Say, but that species was based upon a stray example of *Ena obscura* (Müll.) of Europe." So *marginatus* Say has to be considered as the correct specific name.

*Succinea barbadensis* Guilding (fig. 1a and b).*Succinea barbadensis* GUILDING, Zoological Journal, Vol. III, 1828, pag. 532, pl. XXVII, fig. 4—6.

" " REEVE, Conch. Iconica, Vol. XVIII, 1872, Succinea, pl. VII, fig. 46.

" " GIBBONS, Journ. of Conch. Vol. II, pag. 132, 1879.

" " PILSBRY, Trans. Connect. Acad. Sciences, Vol. X, 1900, pag. 502.

Plantation Plantersrust, 20. IX. 23, numerous spec.

Hato, 1922, numerous spec.

As REEVE pointed out already this shell has a superficial resemblance to European *Succinea putris*. The turns of the latter form a less concise screw so that its whorls are wider apart which excludes the presence of "shoulders" at the successive sutures. Hence the whole character of the shell of *putris* has a more slender and oblique appearance and yet the size of the spire is lower in relation to that of the aperture than in *barbadensis*.

Ten of the larger specimens of our second set present the following measures in mm.:

	1	2	3	4	5	6	7	8	9	10
Height (total) . . . . .	17	16	16	15,5	15	15	15	14	14	13
Height (aperture) . . . . .	11	11	10	10,5	10	10	10	9	9	9
Max. width (aperture) . . .	7	8	6,5	7	7	6,5	6	7	5,5	5,5
Number of whorls . . . . .	3½	3½	3½	3½	3½	3½	3½	3	3¼	3¼

Until now this species has only been recorded from Barbados, St. Vincent and St. Thomas.

*Succinea gyrata* Gibbons (fig. 2a and b).*Succinea gyrata* GIBBONS, Journ. of Conch., Vol. II, 1879, pag. 136, pl. I, fig. 2.

" " VERNHOUT, Notes Leyden Museum, Vol. XXVI, 1914, pag. 179.

" " BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 75—76, pl. XIV, fig. 48, 49 (radula and jaw).

Curaçao, Hato, 13. I. 85, 7 spec.

Plantation Plantersrust, 20. IX. 23, 5 spec.

This species presents many more characteristic features than the preceding one by the peculiarly twisted, elongated spire so high in relation to the aperture as is only rarely observed in this genus. The specimens in the Amsterdam Museum do not reach beyond the dimensions as given by BAKER in the above cited paper.

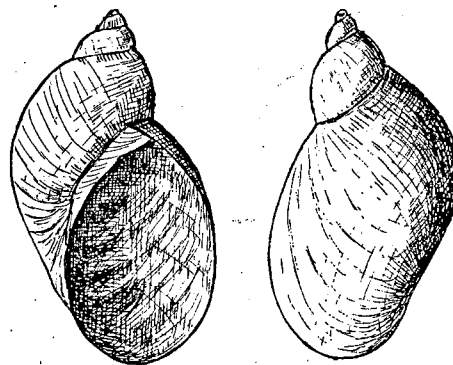


Fig. 1. *Succinea barbadensis* Guilding. × 3.  
a. front view. b. back view.

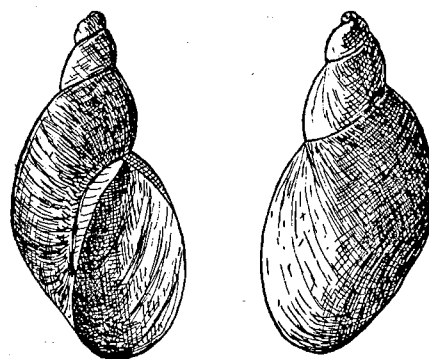


Fig. 2. *Succinea gyrata* Gibbons. × 5.  
a. front view. b. back view.

*Melampus coffea* (Gmelin).

Entrance to Spanish Water, 1 spec.

*Melampus flavus* (Gmelin).Entrance to Spanish Water, 5 spec.  
Caracasbay, 2 spec.*Melampus pusilla* (Gmelin).

Caracasbay, 1 spec.

*Physa cubensis* Pfeiffer. (fig. 3a and b).*Physa cubensis* PFEIFFER, Wiegmann's Archiv f. Naturgesch., Vol. V, 1, 1839, pag. 354, n° 45.

" " REEVE, Conch. Icon., Vol. XIX, Physa, 1874, pl. VII, n° 50.

" " KÜSTER, Mart.-Chem. N. Syst. Conch. Kab., Vol. I, Abt. 17, 1886, pag. 22, pl. III, fig. 17—19.

Hato, 28. IV. 20, 5 spec.

Boca de Leeuw, Hato, 1923, 23 spec.

It is with a slight hesitation that I venture to place the present shells in this species, because the specimens from both sets are immature, the maximal height of the former being 7 mm. (at  $4\frac{1}{2}$  whorls), whereas those from Boca de Leeuw do not reach beyond 6 mm. (at  $3\frac{1}{2}$  whorls). The typically flattened last turn is hardly obvious in the younger individuals of about 3 whorls, but becomes more conspicuous in older animals with more than 3 whorls.

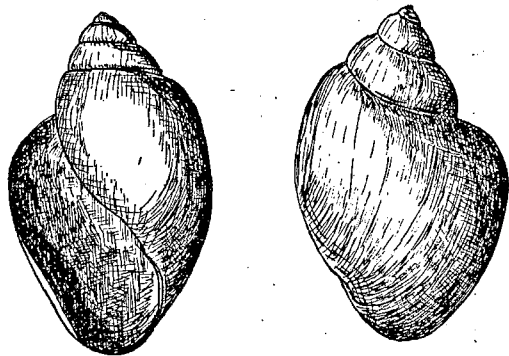


Fig. 3. *Physa cubensis* Pfeiffer.  $\times 5$ .  
a. front view. b. back view.

This species has not been recorded beyond the isle of Cuba which is another example to emphasize Mr. VERNHOUT's opinion (loc. pag. 185—187) that the principal affinities of the molluscan-fauna of Curaçao should not be expected to be found in the non-marine molluscs of the mainland — Guyana and Venezuela — although the mainland is situated even in sight of our island, but on the contrary extend along the arch of Windward Islands to the Greater

Antilles and Central-America. According to his last paper Mr. BAKER appears to be of the same opinion. It must be remembered that this argument has evidently been confirmed in a similar way by other groups of animals (cfr. SCHARFF, The Origin of the West-Indian Fauna, Bijdr. t. d. Dierk., Afl. XXII, 1922, pag. 65—72).

*Planorbis circumlineatus* Shuttleworth. (fig. 4a, b and c).*Planorbis circumlineatus* SHUTTLEWORTH, Mitt. naturf. Ges. Bern, 1854, pag. 96—97.

" " REEVE, Conch. Icon., Vol. XX, Planorbis, 1878, pl. VI, n° 48.

" " CLESSIN, in Mart.-Chemn. N. Syst. Conch. Cab., Vol. XVII, Abt. 1, pag. 211, 1886, pl. 32, fig. 6.

" " DALL &amp; STIMPSON, Bull. U. S. Fish Commission, Vol. XX, first part, 1900, pag. 370.

*Planorbis pallidus* BAKER, Occ. Papers Museum of Zoology University of Michigan, n° 152, 1924, pag. 71—74.

Well Mamaja, Hato, 16 spec.

Well Wandongo, Hato, 14 spec.

In rivulet from Tanki Rincon, on Souax, numerous spec.

Tanki Rincon, on Souax, 9. IX. 23, 2 spec.

Hato, 28. IV. 20, 4 spec.

Tanki Monpoos, Hato, 12 spec.

Well Cajoeda, Hato, 1923, 15 spec.

Well Knoekoe hatoen, Hato, 7 spec.

Tanki Santa Barbara, 19. V. 20, numerous spec.

Boca de Leeuw, Hato, 1923, numerous spec.

Plantation Blauw, 1924, 26 spec.

The *Planorbis* first mentioned from Curaçao were three young specimens which — according to SMITH (Proc. Malac. Soc. London, III, 1898, pag. 113) — „do not offer any special characters, and at present must remain undetermined”. According to the rather extensive amount of localities where recent investigators obtained quite an important series of shells, *Planorbis* seems even to abound in



*Planorbis circumlineatus* occurs further on Humacao, Porto Rico, St.-Thomas and Haiti. This geographical distribution reminds us vividly of analogous conditions with *Physa cubensis* and it will be sufficient to refer to the remarks on the preceding species.

*Amnicola parvula* (Guilding).

- Paludina parvula* GUILDING, Zool. Journ. Vol. III, 1828, pag. 537—538, Suppl. pl. XXVIII, fig. 1—3.  
*Amnicola coronata* var. *crystallina* VERNHOUT, Notes Leyden Museum, Vol. XXXVI, 1914, pag. 180.  
*Potamopyrgus parvulus* H. B. BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 70—71, pl. XI, fig. 45—46.  
 Tanki Santa Barbara, 19.V.20, 12 spec.  
 Hato, 28. IV. 20, 7 spec.  
 Well Cajoeda, Hato, 1923, numerous spec.  
 Well Bak Ariba, 19. IX. 23, numerous spec.  
 Boca de Leeuw, Hato, 1923, 7 spec.  
 Tanki Rincon, on Souax, 9. IX. 23, 9 spec.

*Tudora rupis* H. B. Baker.

- Tudora rupis* BAKER, The Nautilus, Vol. XXXVII, 1924, pag. 5.  
 Hato, 11 spec.

Though BAKER recently divided *Tudora rupis* into two subspecies *rupis* s. str. and *newportensis*, I do not venture to apply one of these names to the relatively small number of animals in our collection.

*Tudora muskusi* H. B. Baker.

- Tudora muskusi* BAKER, The Nautilus, Vol. XXXVII, 1924, pag. 5.  
 Curaçoa, 1 spec.

It is my opinion that BAKER is right when he suggests (Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 53) that *Tudora costata* Menke, described by PFEIFFER (Zeitschr. Malak. Vol. III, 1846, pag. 47) does not suit to the shell recorded by VERNHOUT (Notes Leyden Museum, Vol. XXXVI, 1914, pag. 180) under this name. I had the opportunity to examine the latter specimen which belongs to the Leiden Museum and which is a trifle larger than the one hitherto similarly identified in the Amsterdam collection.

It is not only the characteristics mentioned by BAKER which suffice to distinguish the two Curaçoa-shells collected by Mr. VAN KOOLWIJK about forty years ago from the real *T. costata*. There is still another fact which rouses our suspicion. PFEIFFER namely added to the diagnosis: „Nahe verwandt mit *C. megacheilum*.” This opinion granted, the true *costata* thus being at home in the relationship of *T. megacheile*, consequently belongs to the section *Tudora* which among other things is characterised by the lattice-work sculpture contrary to the representatives of section *Tudorata* with nearly smooth or irregular faintly grated exterior (Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 44 and 55).

The specimens we are discussing here in fact both hardly show any spiral or longitudinal cords but the few especially accentuated ribs which form part of the typical features of *muskusi*.

Just as in the other species of *Tudora* I do not employ the trinomial nomenclature for want of sufficient number of individuals.

*Tudora megacheile* (Potiez & Michaud).

- Cyclostoma megacheilos* POTIEZ & MICHAUD, Gal. Douai, Vol. I, 1838, pag. 237, pl. XXIV, fig. 9—10.  
*Tudora megacheila* SMITH, Proc. Malac. Soc. London, Vol. III, 1898, pag. 116.  
 „ „ VERNHOUT, Notes Leyden Museum, Vol. XXXVI, 1914, pag. 180.  
 „ *megacheilos megacheilos* BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n<sup>o</sup> 152, 1924, pag. 55 ff.  
 Tafelberg, 23. I. 85, 7 spec.  
 Hato, 13. I. 85, 10 spec.  
 Plantation Plantersrust, 24. IX. 23, 7 spec.  
 Near Caracasbay, 20. V. 20, 7 spec.  
 Entrance of Spanish Water, 2 spec.  
 Curaçao, 17 spec.  
 Hato, 1923, 22 spec.  
 Curaçao, 4 spec.

In this species I do not follow either the differentiation into subspecies proposed by BAKER.

Indeed their characteristics, chiefly based on minute differences in habitus, can only be successfully recognised in more extensive series of shells than those which formed the subject of the present study.

*Tudora megacheile* forma *desculpta* H. B. Baker.

*Tudora megacheilos megacheilos* forma *desculpta* H. B. BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n° 152, 1924, pag. 56, pl. X, fig. 34, pl. XIII, fig. B.

Curaçao, 1 spec.  
Hato, 1923, 2 spec.

*Tudora fossor* H. B. Baker.

*Tudora fossor* H. B. BAKER. The Nautilus, Vol. XXXVII, 1924, pag. 6.

Hato, 11 spec.

Same remark as for *Tudora megacheile*.

*Cistulops raveni* (Crosse).

*Cistula raveni* CROSSE, Journ. de Conch., Vol. XX, 1872, pag. 159—160 and Vol. XXI, 1873, pag. 43—44, pl. I, fig. 5.

*Cistulops raveni raveni* BAKER, Occ. Pap. Mus. Zool. Univ. Michigan, n° 152, 1924, pag. 37—40, pl. IX, fig. 26, pl. XI, fig. 42.

Curaçao, 21 spec.  
Tafelberg, 2 spec.  
Tafelberg, 6 spec.

H. B. BAKER gives a figure (Occ. Pap. Mus. Zool. Univ. Michigan, 1923, pl. I, fig. 6) of the apical whorls of this species at high magnitude. In 1924 (The Nautilus Vol. XXXVII, pag. 1—6) he proposed to change the generic name into *Cistulops* with *C. raveni* as its only representative. In a second paper of the same year he separated the species in two subspecies *raveni* s. str. and *arubana* H. B. Baker of which the former inhabits the isle of Curaçao. The author gives detailed descriptions of both subspecies and figures radula and operculum.

Before concluding I wish to present my sincere thanks to Prof. Dr. MAX WEBER, former Director of the Zoological Museum of Amsterdam, as well as to the present one Dr. L. F. DE BEAUFORT for entrusting me the collections alluded to before and for their keen interest and valuable advice during the progress of the work.

By the kind mediation of Prof. Dr. E. D. VAN OORT, Director of the National Museum of Natural History, I was enabled to study for comparison some species of *Tudora* from the Leiden Museum.

Finally I am very much indebted to Dr. C. J. VAN DER HORST for his information and suggestions.

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