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On the conchological identification of Cingula (Setia) fusca (Philippi, 1841), C. (S.) turriculata (Monterosato, 1884), and C. (S.) inflata (Monterosato, 1884), marine gastropods from the Mediterranean

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INTRODUCTION

Neither Philippi's description and figures of *Cingula (Setia*[1]*) fusca* (1841: 53, and 1844: 134), nor Monterosato's descriptions of *Cingula (Setia) turriculata* (1884: 73) and *Cingula (Setia) inflata* (1884: 72) are sufficient to recognize these minute, variable and closely related Mediterranean forms with certainty. Subsequent authors did not improve the situation significantly. For this reason, we identified the taxa from authentic specimens, and studied the variability from lots from many localities. To this end, material from the following collections was studied: (1) U.S. National Museum, Washington, D.C.; (2) Zoologisches Museum, Berlin; (3) Naturhistorisches Museum, Vienna; (4) Dautzenberg collection, now in the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels; (5) Natur-Museum Senckenberg, Frankfurt/Main; (6) Rijksmuseum van Natuurlijke Historie, Leiden; private collections of (7) Dr. F. Nordsieck, (8) Mrs. M.C. Fehr-de Wal, (9) Dr. J.J. van Aartsen, and (10) A. Verduin. It is a pleasure to most kindly thank all those who made their collections accessible for the investigation, or helped us otherwise.

The investigation was exclusively based on shell material. Because of the small number of other characters shown by the shells, measurements play an important role in the investigation. Fig. 1 shows how the measurements B, d, D, L, and M were taken. Accuracy is estimated to be about 0.01 mm when measuring d and D, about 0.02 mm when measuring the other dimensions, and about 0.1 whorls when counting the number of whorls. These estimates apply to shells in good condition only. Moreover, care should be taken to prevent faults caused by incorrect positioning of the shells. The ocular micrometer should be verified because, in our experience, it may be faulty up to about 3 %.

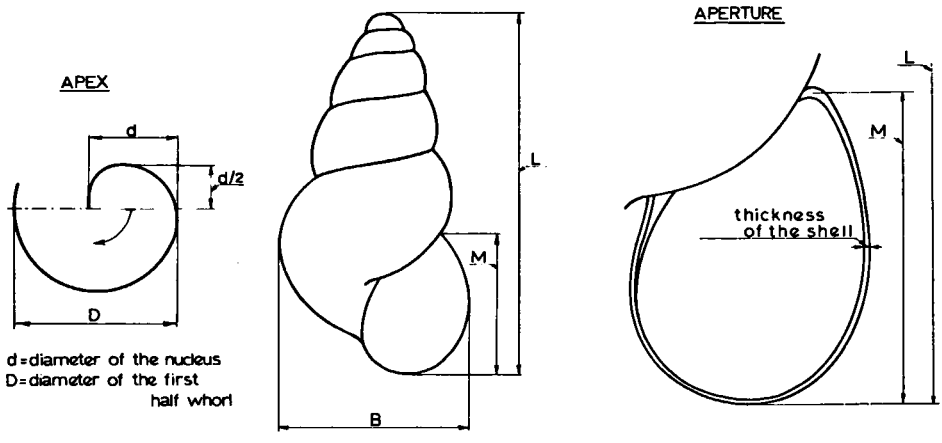


Fig. 1. Definition of the measurements. Note the way the number of whorls is counted.

[1] Nordsieck (1972) places *C. fusca, C. inflata* and *C. turriculata* in three different subgenera, which belong to two different genera and even to two different superfamilies. We cannot accept this view, because our conchological investigation conformed the very close relationship between the three forms, already surmised by e.g., Monterosato (1884: 72) and Priolo (1953: 128-129). Thus, we prefer to classify these taxa in one subgenus.

The conchological characters of the three forms under discussion on the one hand, and those of the type species of *Setia* H. & A. Adams [i.e., *Cingula (Setia) pulcherrima* (Jeffreys, 1848)] on the other hand, clearly point to a very close relationship indeed. We therefore consider the section/subgenus *Rudolphosetia* Monterosato, 1917, with type species *Cingula fusca,* superfluous, and identival with *Setia.*

It is not generally known that the generic name *Cingula* was introduced as early as 1818. Though *Cingula* Fleming, 1818, certainly is an available name, it is questionable whether the designation (by Gray, 1847, vide Coan, 1964: 167) of *Turbo cingillus* Montagu, 1803, as the type species is valid, because Fleming (1818: 311) spelled the specific name *cingellus* with e instead of i, and mentioned no author. However, we may assume that this is an incorrect subsequent spelling of *cingillus*, because (1) the specific name *cingellus* had never been published before; (2) Fleming (1828: 309) afterwards cited the specific name *cingillus*, and mentioned Montagu, 1803, as the author; (3) Fleming, 1818, referred to *Turbo cingellus* as a British marine species; (4) Fleming, 1818, cited the specific name *cingellus* among two other ones, which undoubtedly refer to species published by Montagu, 1803.

By the use of the generic name *Cingula*, we do not wish to pronounce an opinion as to whether or not the subgenus *Setia* should really be considered to belong to the same genus as *C. cingillus.* As regards that question, we simply have no opinion yet. We, however, believe in the usefulness of the preservation of a reasonably stable nomenclature, and therefore fully agree with Warén (1974: 124) that we should keep superficially rather similar species in the same group, as long as the state of knowledge does not permit well founded subdivisions. Thus, it seems to be sensible to concur also with Warén with regard to the use of the generic name *Cingula* s.l. For this reason only, we did not follow Wenz (1938: 607), who divided the genus *Cingula* s.l. into the two genera *Cingula* s.s. and *Putilla* A.Adams, 1867, and who considered *Setia* H. & A. Adams to be a synonym of *Pseudosetia* Monterosato, 1884, which he made a subgenus of *Putilla.* For the sake of completeness we recall the fact that the preoccupation of *Setia* H. & A. Adams, 1852, by *Setia* Oken, 1815, has since been annihilated (ICZN Opinion 417), with the consequence that *Setia* has now seniority over *Putilla.* Thus, those who wish to concur with Wenz, now should refer to the species under discussion as *Setia (Setia)* or *Setia (Rudolphosetia).*

We feel that we owe our readers an explanation for asking so much of their attention for the conchological identification of only three forms. It, however, seems evident that little further progress, and rather an increasing chaos is to be expected with regard to the systematics of small representatives of the European marine malacofauna, unless it is properly established which is which within difficult groups of species. We fail to think of any other practicable way to start this work, but by the examination of authentic material on the one hand, and by studying local and geographic variation from as many and as large as possible samples of shells on the other hand. Finally, we feel that facts and arguments should be reported properly because these are of more scientific value than opinions or even conclusions, in which a speculative element will often be inevitable through lack of complete factual evidence.

Cingula (Setia) fusca (Philippi, 1841)

SHELL. Figs. 2-4 show some representative specimens. There is a distinct, deep but narrow, umbilicus, which, however, may be somewhat concealed by the inner lip of the mouth[2]. The variability of the shells is shown in figs. 21 and 22. The longest shell from the type locality measures 2.35 mm; it is not shown in fig. 21 because the number of its whorls cannot be counted accurately. See, however, figs. 4a and 36.

For ease of comparison, identical lines have been drawn in figs. 21-36; these lines about coincide with the lower limits of the range of variation of *C. fusca.* For L, B and M, see fig. 1.

SCULPTURE. The edge of the mouth is simple, without labial rib or varix. On the upper whorl of some specimens delicate, dense spiral striae can be seen. Otherwise, the shells are completely smooth, except, of course, for fine growth lines.

APEX. The apical dimensions vary between 0.12/0.21 mm and 0.15/0.26 mm. The first one of each pair of these measurements is the diameter of the nucleus d, the second one that of the first half whorl D, see fig. 1.

COLOUR. Colour is an important character for the identification of *C. fusca.* It varies between auburn and a pale shade of brown. Often the upper whorls are of a darker brown than is the remainder of the shell. In some shells a paler colour band can be seen just below the periphery, the colour pattern shown in fig. 10. Fig. 11 shows a third colour pattern, which we found among a few shells from Ognina, 10 km S. of Siracusa, Sicilia[3] (colln. 3) and from Malta (fig. 22). These colour patterns themselves, however, are also subject to some variation. Thus, the narrow dark colour band at the periphery of shells with the colour pattern shown in fig. 11, exceptionally tends to break up into separate dashes on the last half whorl. Occasionally the colour pattern shown in fig. 19 seems to occur in *C. fusca* too. Nevertheless, the colour patterns shown in figs. 9-11 give a good impression of the variation in *C. fusca.* As will be discussed later, we believe that Monterosato did not separate *C. fusca* and *C. turriculata* properly, and that his varieties *seriata* and *alba* do not belong to *C. fusca*, but represent colour patterns which are characteristic of *C. turriculata.*

[2] There can be nou doubt that Philippi wrongly used the words: "eine Nabelspalte ist ebenfalls nicht deutlich" (1841: 54), and "Fissura umbilicaris obsoleta" (1844: 134).

[3] The spelling of the geographical names is as recommended by the Times Atlas of the World.

GEOGRAPHIC DISTRIBUTION. Apart from the large quantities of shells from Palermo (nearly all collected by Monterosato!) in different collections, we saw only one other large sample, i.e. from Malta, see fig. 22. Furthermore we saw only small lots from Trapani, Sicilia (fig. 25); Ognina, Sicilia (colln. 3); Alger (fig. 26); Calpe, E. Spain (figs. 34 and 35); Corse (colln. 3); Gandoli, 10 km S. of Taranto (colln. 10, subfossil?), which we consider to belong to this species.

Cingula (Setia) turriculata (Monterosato, 1884)

SHELL. Figs. 6-8 show some representative specimens. The variability of the shells, which is partly outside the range of variation of *C. fusca*, is shown in figs. 23-35. Note the considerable geographic variation of the species. As will be discussed later, we believe that Monterosato wrongly identified specimens with *fusca*-habitus but *turriculata*-colour as *C. fusca.*

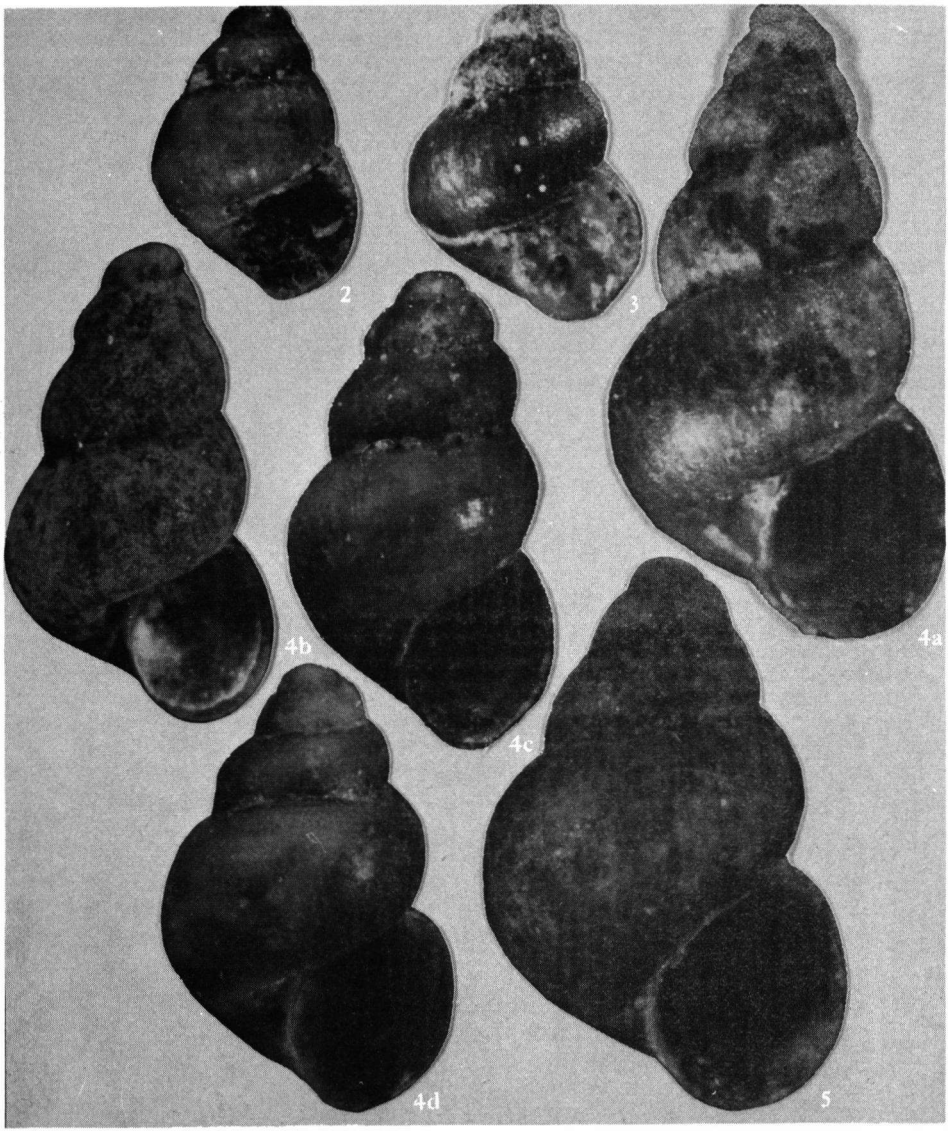
SCULPTURE. Usually completely identical to that of *C. fusca.* The samples from Calpe (figs. 34 and 35), though, contain a few specimens with the whole surface covered by delicate and dense spiral striae. We saw similar specimens from Lagos, S. Portugal (colln. 8), and from Getarès, S. Spain (fig. 33).

APEX. The apical dimensions vary between 0.08/0.15 mm and 0.15/0.25 mm. They are subject to both local and geographic variation.

COLOUR. Shells with *fusca*-habitus can usually only be separated from that species by the colour. When fresh, the shells are normally of a pale, transparent, horny colour, which changes into white after an extended time on the beach. Usually, the upper whorls are of a darker colour. A spiral row of about 12 yellow spots can often be seen on the periphery. The vertical dimension of each spot rarely or never surpasses the horizontal one, so that the spots often form a broken line, see fig. 13. Sometimes a second spiral row of about square spots appears on the base. A third spiral row may appear just below the suture; the vertical dimension of the spots of this upper row tends to surpass the horizontal one, see fig. 15. As far as we are aware, Monterosato never mentioned the colour variety with one or more spiral rows of yellow spots, which obviously is common among *C. turriculata*, and which we also saw among authentic specimens from Palermo! Figs. 16-20 show a number of other colour patterns which occur in *C. turriculata.* Occasionally, the colour patterns shown in figs. 9 and 11 can also be found among *C. turriculata.* Obviously, this confirms the close relationship with *C. fusca*, so that it is not always possible to identify individual shells with certainty. It should, however, be remarked that among *C. turriculata* these confusing colour patterns seem to be rare in shells longer than 1.5 mm (cf. figs. 27, 28 and 32). Though specimens with one or more spiral rows of yellow spots are very common in nearly the whole Mediterranean, they are rare or absent in Calpe, E. Spain; Alger; Getarès, S. Spain; Tarifa, S. Spain; Lagos, S. Portugal; and the Islas Canarias.

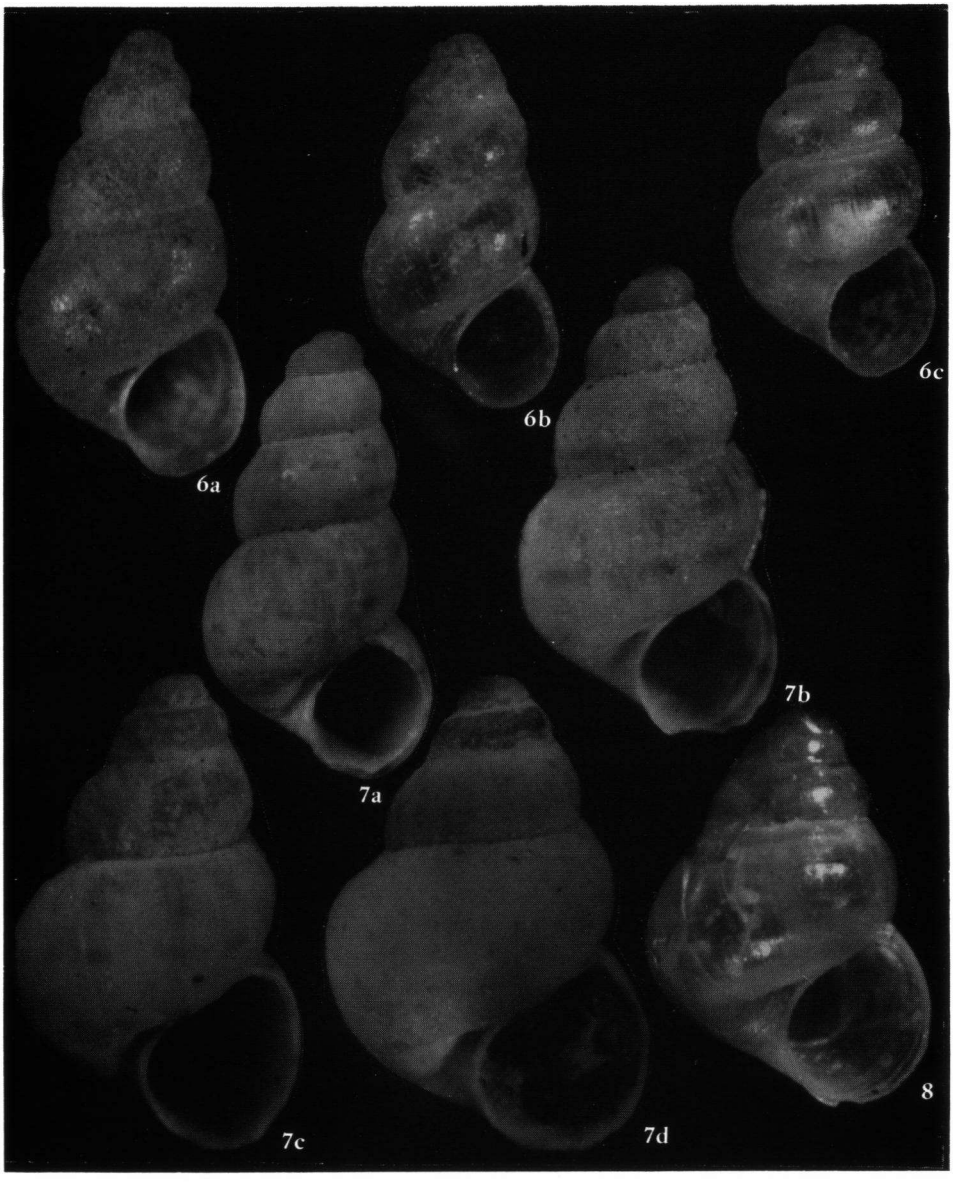
GEOGRAPHIC DISTRIBUTION. The species can be found in large numbers among material washed ashore at many localities all over the Mediterranean. In the Straits of Gibraltar, Lagos, and the Islas Canarias it does not seem to grow beyond 1.2 mm in length.

SYNONYMS. The varieties *albida* Monterosato and *seriata* Monterosato of *C. (S.) fusca* (Philippi). *C. (S.) soluta* (Philippi) sensu Monterosato; the British Museum possesses a sample (No. 1911.10.26.24432-24436) labelled: "Setia soluta (Phil.)/Trapani" in the

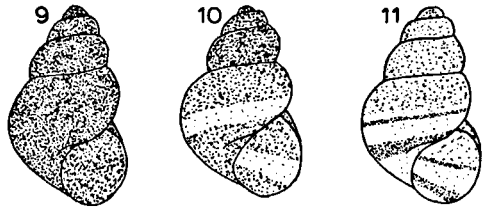


Figs. 2-4. *Cingula (Setia) fusca* (Philippi), 35X. 2, "Rudolfosetia fusca (Phil.)/Palermo/ Philippi", Zoologisches Museum Berlin 14031. 3, "Truncatella fusca Ph?/ (ex coll. Philippi) Berlin Museum", U.S. National Museum 182941, Jeffreys colln. 4, "Rodolfosetia fusca Ph./Palermo, Sicily (over) /Monterosato/Alghoide! Subterrestre", U.S. National Museum 332303. 4a, longest specimen; 4b-d, specimens of different slenderness.

Fig. 5. *Cingula (Setia) fusca* forma *inflata* (Monterosato), 35X. "Setia inflata Monts./Messine/Coll del Prete 6.9.86/Nom. generica p. 72", Dautzenberg colln.



Figs. 6-8. *Cingula (Setia) turriculata* (Monterosato), 35X. 6, "Rudolfosetia turriculata Calc./Palermo, Sicily (Alghoidal)/Monterosato", U.S. National Museum 332304. 7, Sidi Daoud, near Cap Bon, E. of Tunis. Colln. 9, No. 9335. Specimens of different slenderness. 8, "Setia fusca var./Palermo/Monts. 19.9.82", Dautzenberg colln.

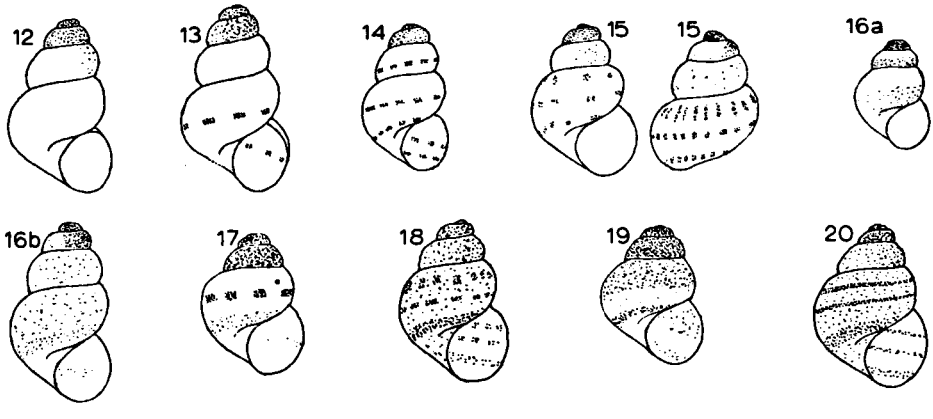


Figs. 9-11. Colour patterns in *Cingula (Setia) fusca* (Philippi), 15X. "Setia fusca Ph. (= paludinoides Calc. var.)/Ognina, Zone subterr./Coll. Monterosato 1889-90 No 503", Naturhistorisches Museum Wien 27703.

characteristic handwriting of Monterosato. These specimens are without doubt conspecific with *C. (S.) turriculata*. Rather small (1-1.2 mm, 3-3.5 whorls), uniform whitish except for the yellow-brown top whorl, and the umbillicus is somewhat more open than usual. Identical specimens are present in our own samples from Trapani, Mondello and other localities.

Cingula (Setia) fusca forma *inflata* (Monterosato, 1884)

We examined only six specimens of *inflata*, all from the type locality Messina; two of these are authentic specimens. One shell is shown in fig. 5. The measurements of five specimens are given in figs. 22 and 36; those of the sixth specimen could not be taken. Judging from these few shells, *inflata* is very similar to *C. fusca* indeed. Neither the length



Figs. 12-20. Colour patterns in *Cingula (Setia) turriculata* (Monterosato), 15X. 12-13, Sciacca, S. Sicilia. Colln. 10, No. 0048. 14, Marzameni, SE. Sicilia. Colln. 10, No. 0048. 15-17, Seusset les Pins, 35 km W. of Marseille. Colln. 8. 16a, Mondello, 10 km NW. of Palermo. Colln. 10, No. 0037. 16b, Calpe, 25 km S. of Denia, E. Spain. Colln. 9, No. 1881. 18, 20, Sidi Daoud, near Cap Bon, E. of Tunis. Colln. 9, No. 9335. 19, Biograd, 25 km SE. of Zadar, Jugoslavia. Colln. 10, No. 0209.

nor the other measurements seem to be very much outside the range of variation of the latter species. It should be remarked, however, that the shell of fig. 5 possesses a different colour pattern, in that on the last half whorl three spiral rows of darker spots can be seen, as described for *C. turriculata*, be it that the colour of the background is brown, as in *C. fusca* and not white, as in *C. turriculata*. We did find no other such colour patterns among samples of *inflata* or *C. fusca*. Otherwise, we saw no differences, between the colour of *inflata* and *C. fusca*. We therefore suppose that the greenish colour mentioned by Monterosato (1884: 72) originates from fine algae on the periostracum. If so, this might point to a different habitat of *inflata*, which is in accordance with labels which accompany samples collected by Monterosato and which mention *C. fusca* as living in the "subterrestre" zone, i.e. high in the intertidal zone, and *inflata* to be a littoral form. Because the intertidal zone is so narrow, it is, however, questionable whether such differences are of much importance in the Mediterranean.

As far as we know, *inflata* has only been mentioned from localities other than Messina by Nordsieck (1972: 158) and by Bellini (vide Priolo, 1953: 130). Dr. Nordsieck was so kind as to let us examine the specimens in his collection. In our opinion, these do not belong to the species under discussion. We therefore doubt very much whether *inflata* is any more than a local form of *C. fusca*.

DISCUSSION

The first question is, whether *C.fusca* and *C. turriculata* really are separate species. There are a number of arguments which plead for considering them to be so indeed:

(1) We saw four samples which consist of *C. turriculata*, except for a few shells which distinguish themselves from the remainder of the sample in colour and measurements, and which we consider to belong to *C. fusca*, see figs. 25, 26, 34 and 35.

(2) The measurements of all specimens of *C. fusca* are within the range of variation as given in figs. 21 and 22, i.e. above the broken lines in figs. 21-36. The range of variation of none[4] of the many samples of *C. turriculata* we examined, however, fully coincides with that of *C. fusca* because always the measurements of relatively large numbers of shells are below these broken lines.

(3) We noticed that in many samples of *C. fusca* (i.e. those from Palermo, Malta, Corse, and Alger) the shells still have the periostracum, and often also the operculum, which we rarely saw among shells of *C. turriculata*. Obviously, most shells of *C. fusca* had been collected alive or in a very fresh state, in contrast to those of *C. turriculata*. In a few cases, this even applies to samples from the same locality, e.g. Palermo and Alger. This, and the fact that among material washed ashore *C. fusca* is definitely scarce, points strongly to different habitats of the taxa, a conclusion which is supported by labels which accompany samples collected by Monterosato and which mention *C. fusca* to live in the "subterrestre" zone and *C. turriculata* to be a littoral species. Moreover, Monterosato (1884: 73) reports *C. turriculata* to be "abbondante ma locale all' Arenella", while no such remark is made with regard to *C. fusca*[5]. It is possible, of course, that, unlinke in *C. fusca*,

[4] With the exception of one small sample from Ognina, Sicilia.

[5] Colln. 3, however, contains a small sample (No. 27703) of *C. fusca* from Arenella.

the periostractum in *C. turriculata* is so smooth and transparent that we overlooked its presence. This, however, would corroborate, rather than affect our conclusion that they are separate species.

Secondly, we will discuss the lines along which we separated *C. fusca* and *C. turriculata*. As can be seen from figs. 21-23, the measurements of the authentic specimens of *C. turriculata* are outside the range of variation of *C. fusca*. Moreover, all authentic specimens of *C. turriculata* are white or colourless, with a spiral row of very faint yellow spots on the periphery of a few specimens. Samples from a number of other Sicilian localities (Sciacca, see fig. 24; Termini, 45 km SE. of Palermo; Marina di Palma, 70 km SE. of Sciacca; all samples in colln. 10) are completely similar to the authentic specimens of *C. turriculata*, be it that on part of the shells the yellow spots are more clearly visible, and that on some shells two, or even three spiral rows of such spots van be seen. Samples from other Sicilian localities, in particular those from Marzameni (fig. 27) and Mondello (fig. 28), however, contain similarly coloured shells with both *fusca*-habitus as well as *turriculata*-habitus. This raised the question, whether the colour or whether the habitus is the character which distinguishes both species. The answer came from large samples from Gandoli (fig. 29), St. Raphaël (fig. 30), Biograd, 25 km SE. of Zadar, Jugoslavia (colln. 10), and from Sidi Daoud (figs. 31 and 32). All four samples contain shells with *fusca*-habitus as well as with *turriculata*-habitus. The samples from the first three localities consist exclusively, or nearly so, of white shells with and without spiral rows of yellow spots. There can be no reasonable doubt that at least the samples from St. Raphaël and Gandoli each belong to one species only. The samples from Biograd and Sidi Daoud are very similar to each other, except that far more (about 11%) of the shells in the latter sample possess one of the special colour patterns shown in figs. 9, 11 and 16-20. The range of variation of the measurements of the shells is extremely wide in both samples, and in addition to this, the shells with more than about 3.8 whorls seem to fall into two groups, one with *fusca*-habitus, the other with *turriculata*-habitus. Yet, each sample as a whole certainly does not give the impression to belong to more than one species only. We plotted the measurements of the shells with special colour pattern in the sample from Sidi Daoud separately[6] in fig. 32. By comparing this figure with fig. 31, we found that no shells with special colour pattern occur among the shells below the imaginary lines which connect each pair of arrows drawn in fig. 31, and that they seem to be distributed more or less uniformly over the remainder of the shells. To our suprise, the imaginary lines coincide with belts in the range of variation of the measurements of the shells in the sample which contain conspicuously few shells, as can be clearly seen in fig. 31. Yet, it seems impossible to accept these imaginary lines as a separation between *C. fusca* and *C. turriculata*, because the requirement that shells with, say 0.5 whorls or less should still have positive values of L, B and M, seems not to be met by the hypothetical species below the imaginary lines. In other words, the imaginary lines completely differ from the broken lines drawn in figs. 21-36, which obviously are characteristic of the way the measurements develop during growth of the individual shells, and which, moreover, neatly separate the sample of *C. fusca* from Palermo (fig. 21) from that of *C. turriculata* from Sciacca (fig. 24). We therefore prefer to assume that the samples from Biograd and

[6] Because we had to measure these shells all over again, the dots in figs. 31 and 32 do not coincide completely.

Sidi Daoud belong to one species only, in the shells of which sexual dimorphism occurs[7]. Special colour patterns seem to be confined exclusively, or nearly so, to one of the sexes only, or at least do not longer appear in the other sex as soon as the shells have reached a certain number of whorls. Moreover, the adult shells of the latter sex seem to have, on the average, a higher number of whorls than those of the other one, which might explain the belts with few specimens, indicated by the arrows in fig. 31. It stands to reason that the latter phenomenon becomes only apparent in samples which possess an extraordinary wide range of variation of the measurements of the shells.

We still do not know whether the samples from St. Raphaël, Gandoli, Biograd and Sidi Daoud belong tc *C. fusca* or *C. turriculata*. We have already concluded before, however, that there is no evidence whatsoever for *C. fusca* to have a *turriculata*-habitus. Obviously, therefore the colour, and not the habitus, must be considered the distinguishing character between *C. fusca* and *C. turriculata*. In addition, it will be clear from fig. 32 that the colour patterns shown in figs. 16-20 belong to the latter species. None of the many other samples examined by us gives any reason to doubt these conclusions.

We did not see authentic specimens of the varieties *vittata, seriata* or *alba* of *C. fusca*, mentioned by Monterosato (1884: 72). Collection 4, however, contains a sample labelled: "Setia fusca var./Palermo/Monts. 19.9.82" (i.e. dated two years before Monterosato's publication), which consists of three white shells which might well represent the variety *alba* (fig. 8) and one white shell with two spiral rows of yellow spots which might represent the variety *seriata*. By the look of them, they certainly have not been collected alive or in a very fresh condition, and therefore must have been collected separately from the many samples of *C. fusca* which Monterosato obtained at Palermo. Thus, they have nothing in common with the latter samples but for the *fusca*-habitus. In our opinion they certainly do belong to *C. turriculata*, and only confirm that Monterosato did not separate *C. fusca* and *C. turriculata* along the correct lines.

From Calpe (figs. 34 and 35), Alger (colln. 4 and 5, see also fig. 26), Getarès (fig. 33), Tarifa (colln. 10), Lagos (15 shells in colln. 8) and the Islas Canarias (10 specimens from Las Canteras in colln. 8, and three from Hierro, RGM[8] No. 221346) we saw samples which in our opinion should be considered to belong to *C. turriculata*, because most of the specimens in each sample cannot be distinguished from many specimens in e.g., the sample from Sciacca. Yet, the samples on the whole differ from representative Mediterranean samples in a number of aspects: (1) spiral rows of yellow spots seem to be absent; (2) some specimens from Calpe, Getarès and Lagos possess delicate, dense, spiral striae on the entire shell; (3) the length of the specimens from Getarès, Tarifa, Lagos, and the Islas Canarias does not surpass 1.2 mm (shells longer than 1.5 mm seem to be relatively less frequent at Calpe and Alger than in many other large samples from Mediterranean localities).

[7] A comparable case of sexual dimorphism has been reported by Rasmussen (1973: 247) who described that in *Rissoa albella* Lovén the shells of the males tend to be longer and more slender than those of the females.

[8] R(ijksmuseum van) G(eologie en) M(ineralogie), Leiden.

There are a number of other species which can be mistaken for *C. fusca* or *C. turriculata*. Because we do not yet know the identity of all of these, and even doubt whether some of them have been described at all, we prefer to deal with them in future papers.

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SAMENVATTING

Over de systematiek van Cingula (Setia) fusca, C. (S.) turriculata en C. (S.) inflata, marine gastropoden uit de Middellandse Zee

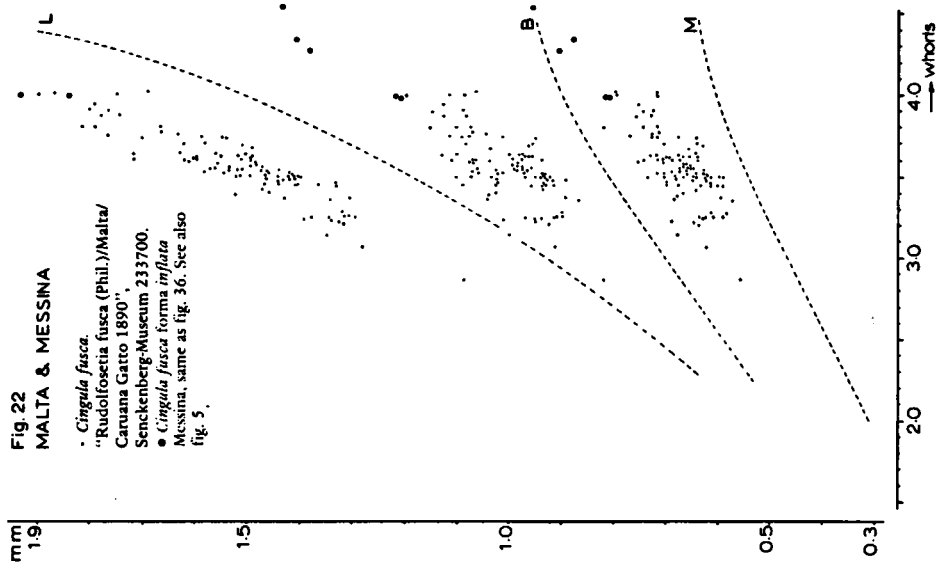
Op grond van uitvoerige metingen en aanvullende waarnemingen aan o.a. authentiek materiaal wordt waarschijnlijk gemaakt dat *Cingula fusca* en *C. turriculata* verschillende soorten zijn en dat *C. inflata* vermoedelijk een locale vorm van *C. fusca* is. In tegenstelling tot de beschrijvingen van Philippi is *C. fusca* wel degelijk genaveld.

De kleur blijkt het belangrijkste kenmerk waarop *C. fusca* en *C. turriculata* kunnen worden onderscheiden. *C. fusca* is gewoonlijk (soms zeer licht) bruin, *C. turriculata* is gewoonlijk witachtig met (soms zeer licht) bruine topwindingen en vaak met één tot drie rijen spiraalsgewijs gerangschikte gele vlekken op de laatste winding. In beide soorten komen ook diverse andere kleurpatronen voor (fig. 9-20), waardoor het soms moeilijk is individuële schelpen te determineren.

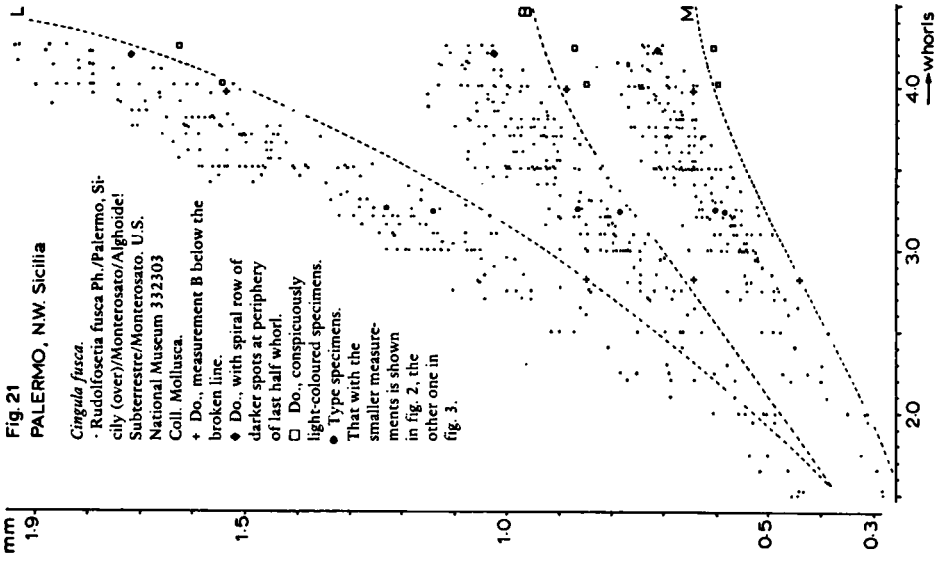
Zowel wat betreft afmetingen, kleurpatronen als sculptuur (fijne spiraalsculptuur op de topwindingen en soms op de gehele schelp komt voor) vertonen *C. fusca* en *C. turriculata* geografische variabiliteit.

C. turriculata is in de gehele Middellandse Zee algemeen in gruis; ook op de Canarische eilanden komt de soort voor. *C. fusca* is veel zeldzamer, hoewel plaatselijk soms algemeen. *C. inflata* is met zekerheid alleen van Messina, Sicilië, bekend.

De geslachtsnaam *Rudolphosetia* Monterosato, 1917, is overbodig en synoniem met *Setia* H. & A. Adams, 1852.



The broken lines about coincide with the lower limits of the range of variation of L, B and M of *Cingula fusca.* For L, B and M, see fig. 1. For ease of comparison identical lines have been drawn in figs. 21-36.



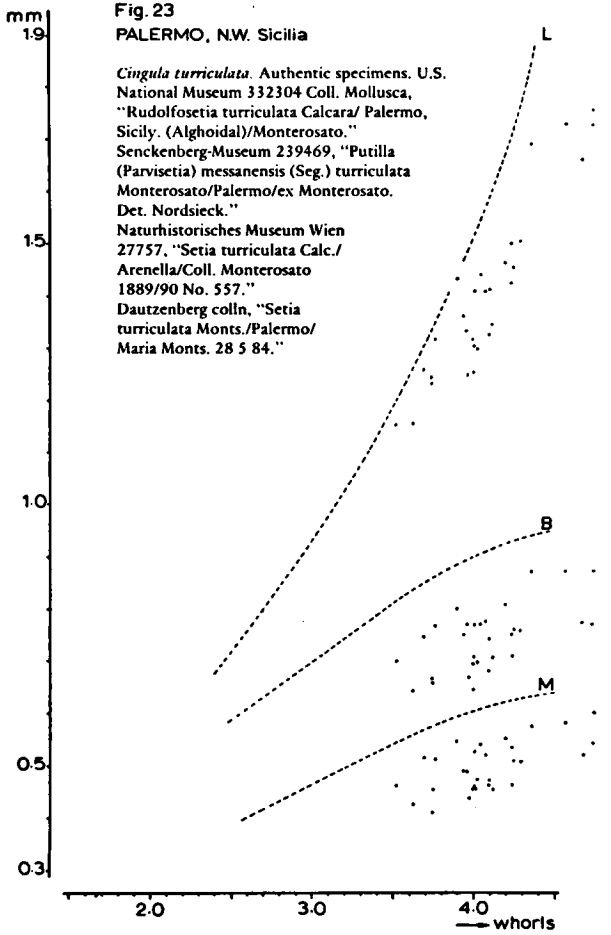


Fig. 23
PALERMO, N.W. Sicilia

Cingula turriculata. Authentic specimens. U.S. National Museum 332304 Coll. Mollusca, "Rudolfosetia turriculata Calcara/ Palermo, Sicily. (Alghoidal)/Monterosato." Senckenberg-Museum 239469, "Putilla (Parvisetia) messanensis (Seg.) turriculata Monterosato/Palermo/ex Monterosato. Det. Nordsieck." Naturhistorisches Museum Wien 27757, "Setia turriculata Calc./ Arenella/Coll. Monterosato 1889/90 No. 557." Dautzenberg colln, "Setia turriculata Monts./Palermo/ Maria Monts. 28 5 84."

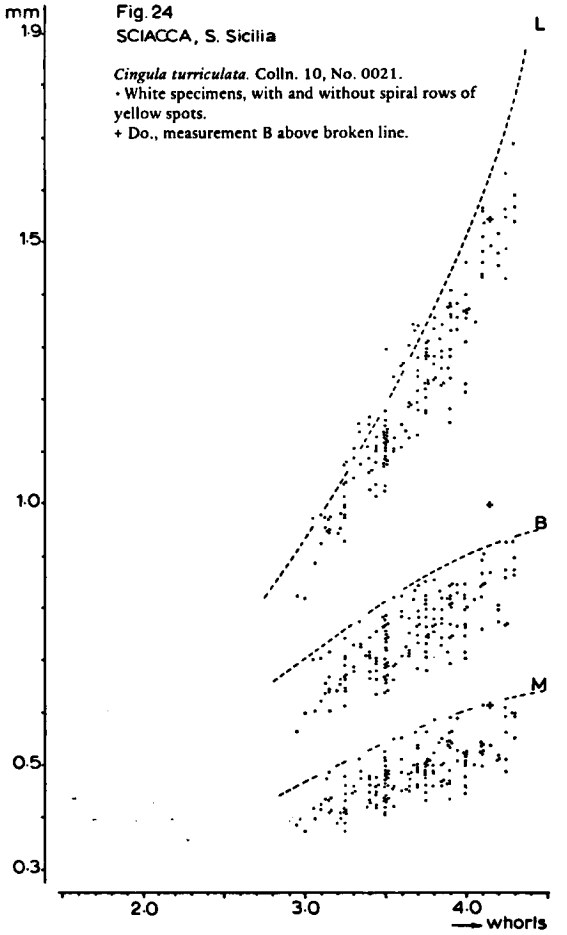


Fig. 24
SCIACCA, S. Sicilia

Cingula turriculata. Colln. 10, No. 0021.
• White specimens, with and without spiral rows of yellow spots.
+ Do., measurement B above broken line.

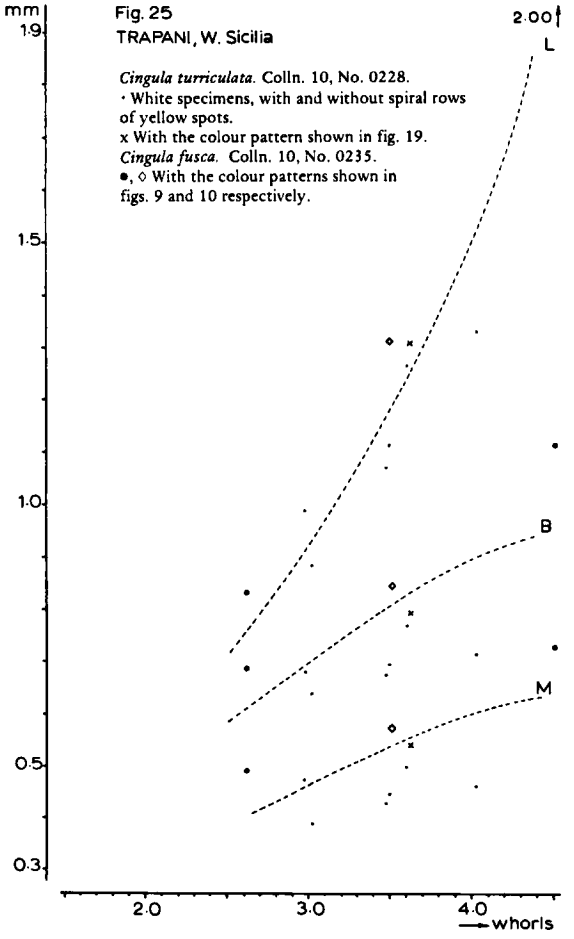


Fig. 25
TRAPANI, W. Sicilia

Cingula turriculata. Colln. 10, No. 0228.
· White specimens, with and without spiral rows of yellow spots.
x With the colour pattern shown in fig. 19.
Cingula fusca. Colln. 10, No. 0235.
●, ◇ With the colour patterns shown in figs. 9 and 10 respectively.

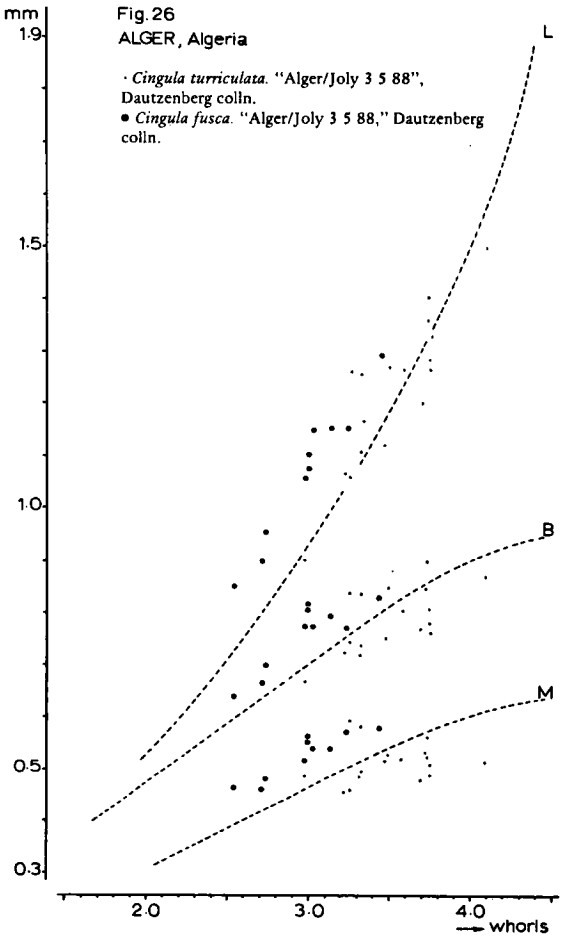


Fig. 26
ALGER, Algeria

· *Cingula turriculata*. "Alger/Joly 3 5 88", Dautzenberg colln.
● *Cingula fusca*. "Alger/Joly 3 5 88," Dautzenberg colln.

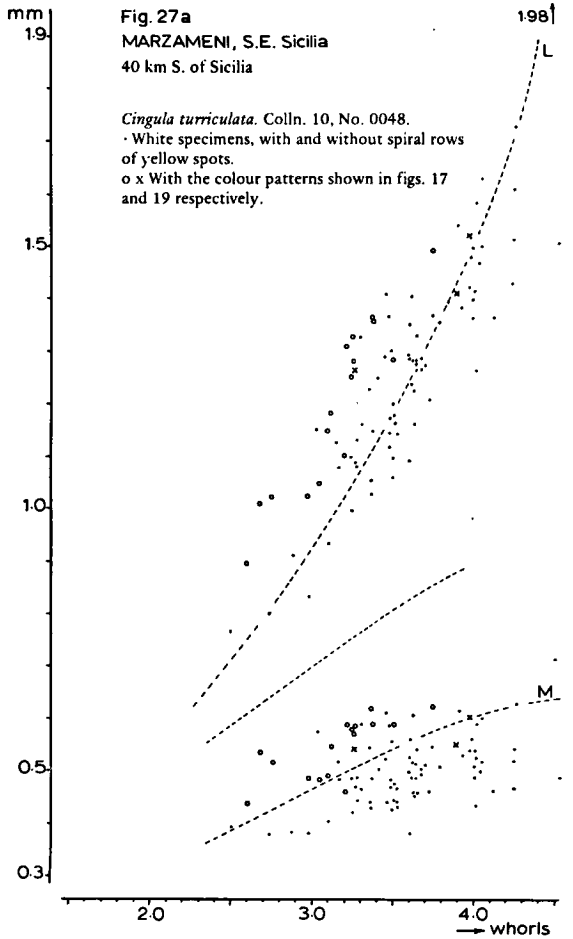


Fig. 27a
MARZAMENI, S.E. Sicilia
40 km S. of Sicilia

Cingula turriculata. Colln. 10, No. 0048.
· White specimens, with and without spiral rows of yellow spots.
o x With the colour patterns shown in figs. 17 and 19 respectively.

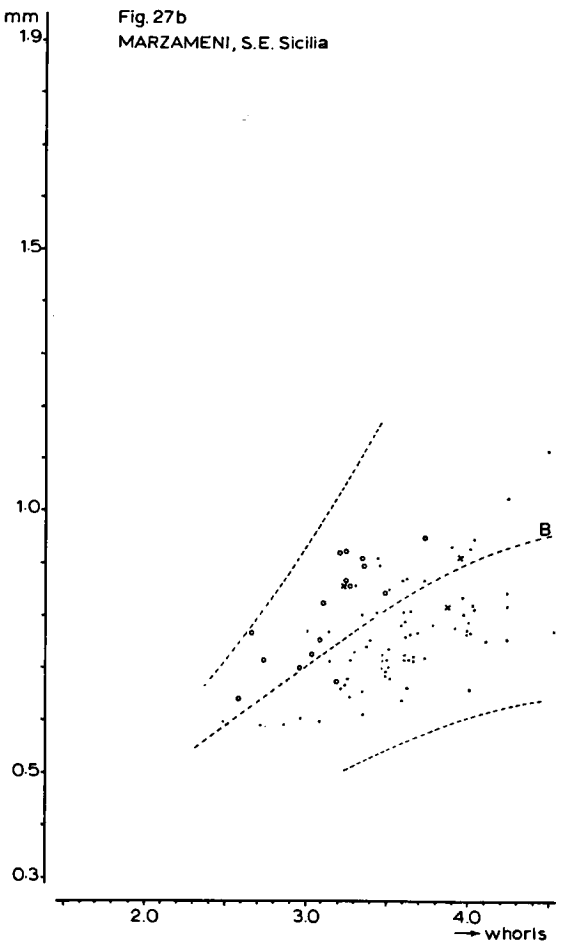


Fig. 27b
MARZAMENI, S.E. Sicilia

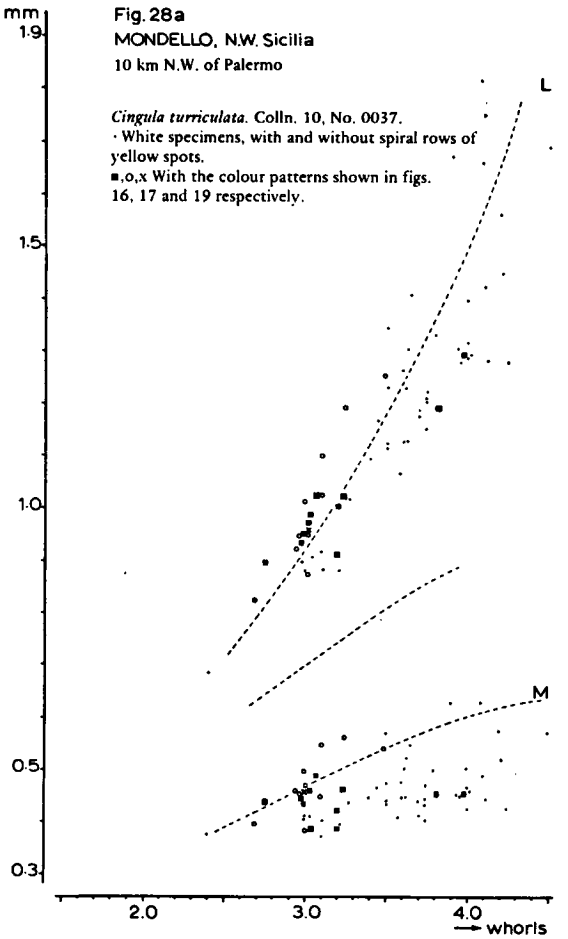


Fig. 28a
MONDELLO, N.W. Sicilia
10 km N.W. of Palermo

Cingula turriculata. Colln. 10, No. 0037.
· White specimens, with and without spiral rows of yellow spots.
■,o,x With the colour patterns shown in figs. 16, 17 and 19 respectively.

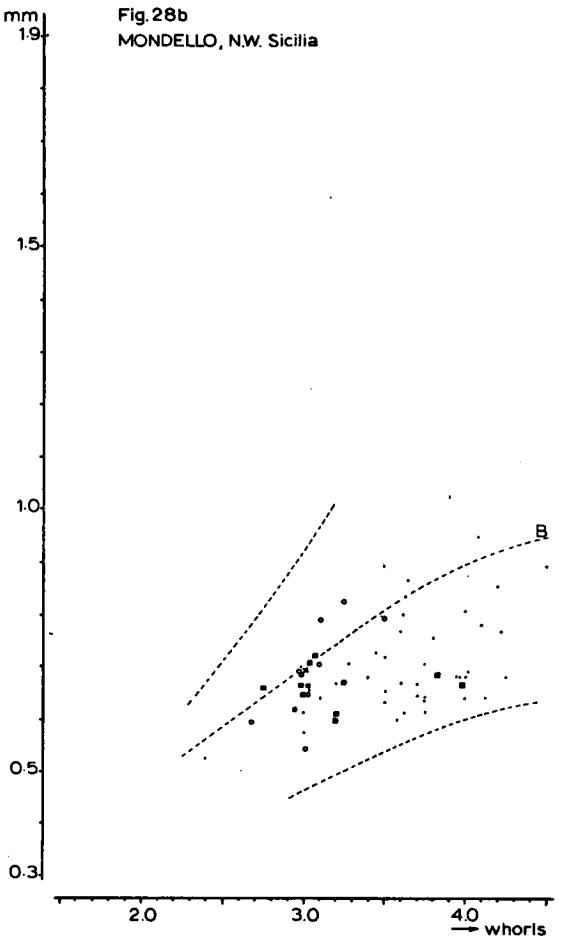


Fig. 28b
MONDELLO, N.W. Sicilia

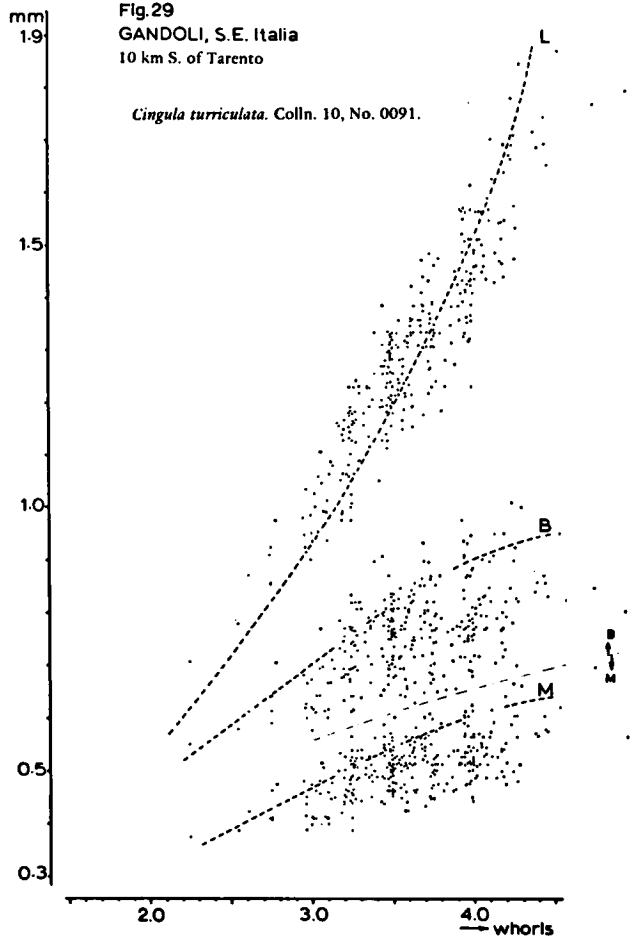


Fig. 29
GANDOLI, S.E. Italia
10 km S. of Tarento

Cingula turriculata. Colln. 10, No. 0091.

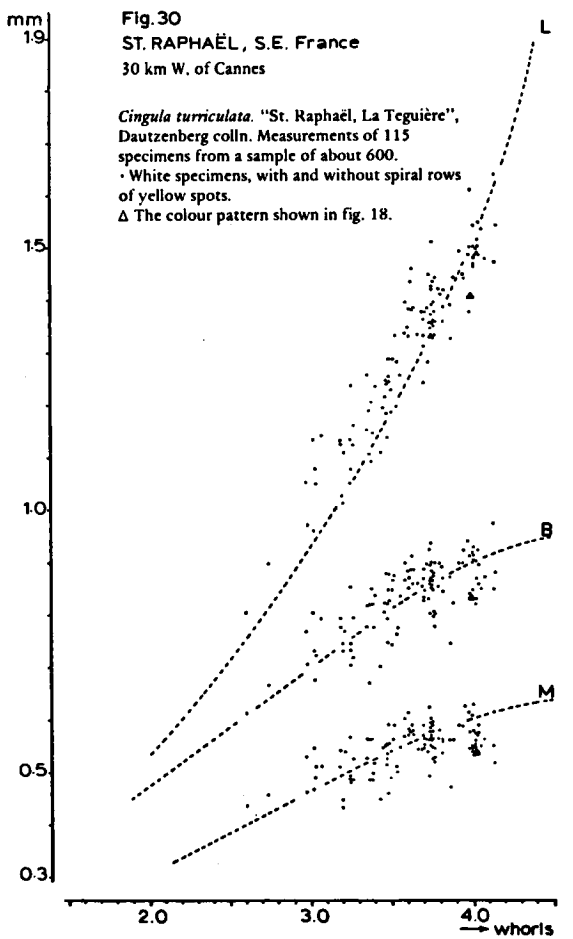


Fig. 30
ST. RAPHAËL, S.E. France
30 km W. of Cannes

Cingula turriculata. "St. Raphaël, La Teguière", Dautzenberg colln. Measurements of 115 specimens from a sample of about 600.
• White specimens, with and without spiral rows of yellow spots.
Δ The colour pattern shown in fig. 18.

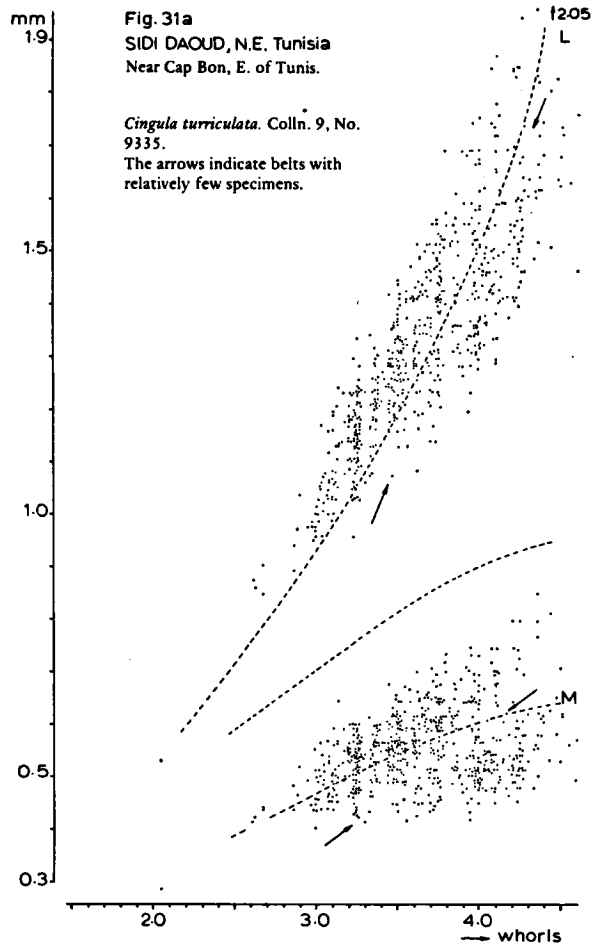


Fig. 31a
SIDI DAOUD, N.E. Tunisia
Near Cap Bon, E. of Tunis.

Cingula turriculata. Colln. 9, No. 9335.
The arrows indicate belts with relatively few specimens.

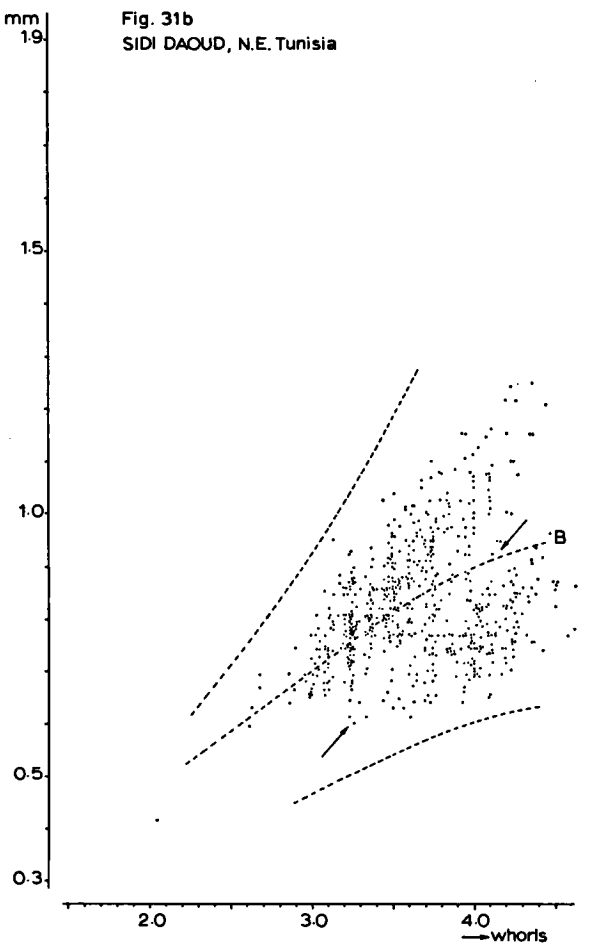


Fig. 31b
SIDI DAOUD, N.E. Tunisia

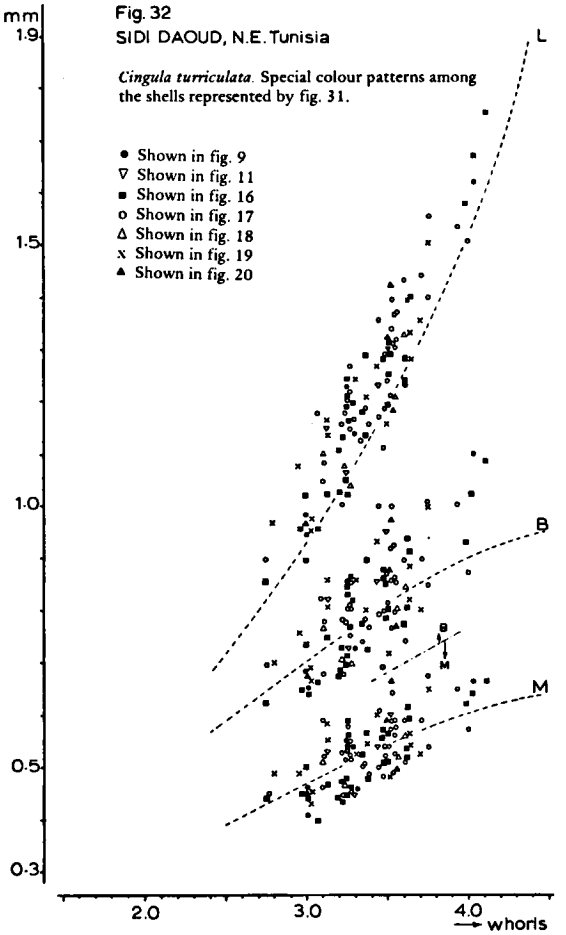


Fig. 32
SIDI DAOUD, N.E. Tunisia

Cingula turriculata. Special colour patterns among the shells represented by fig. 31.

- ● Shown in fig. 9
- ▽ Shown in fig. 11
- ■ Shown in fig. 16
- o Shown in fig. 17
- Δ Shown in fig. 18
- x Shown in fig. 19
- ▲ Shown in fig. 20

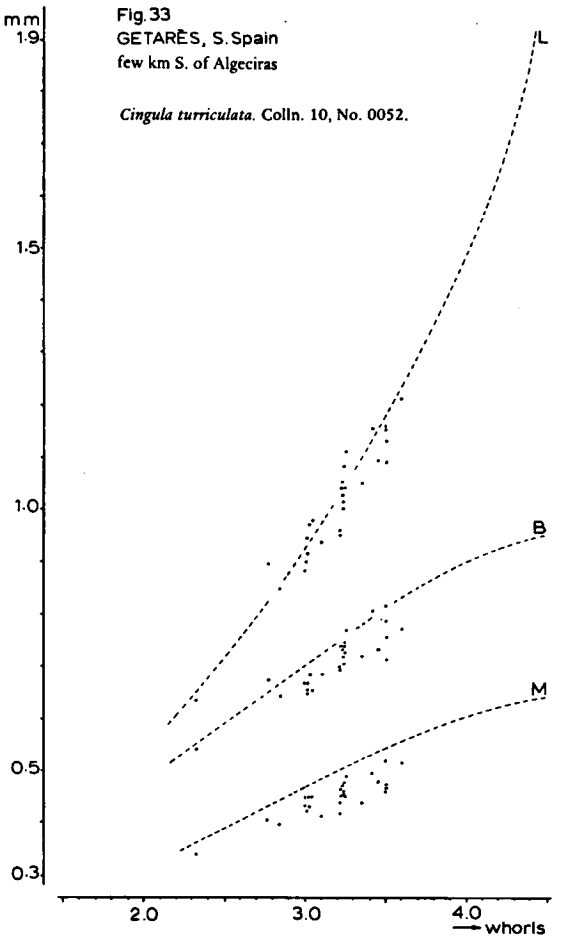


Fig. 33
GETARÈS, S. Spain
few km S. of Algeciras

Cingula turriculata. Colln. 10, No. 0052.

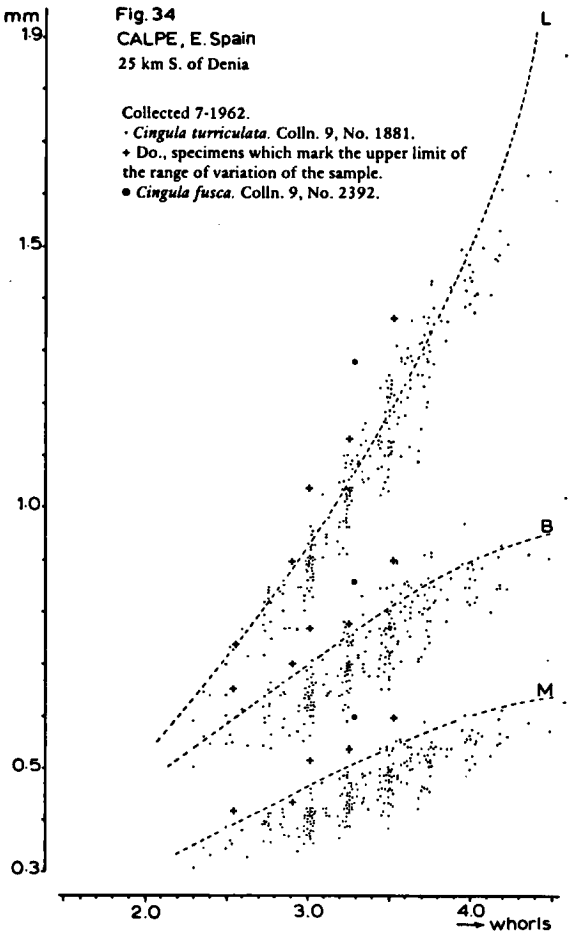


Fig. 34
CALPE, E. Spain
25 km S. of Denia

Collected 7-1962.
· *Cingula turriculata*. Colln. 9, No. 1881.
+ Do., specimens which mark the upper limit of the range of variation of the sample.
• *Cingula fusca*. Colln. 9, No. 2392.

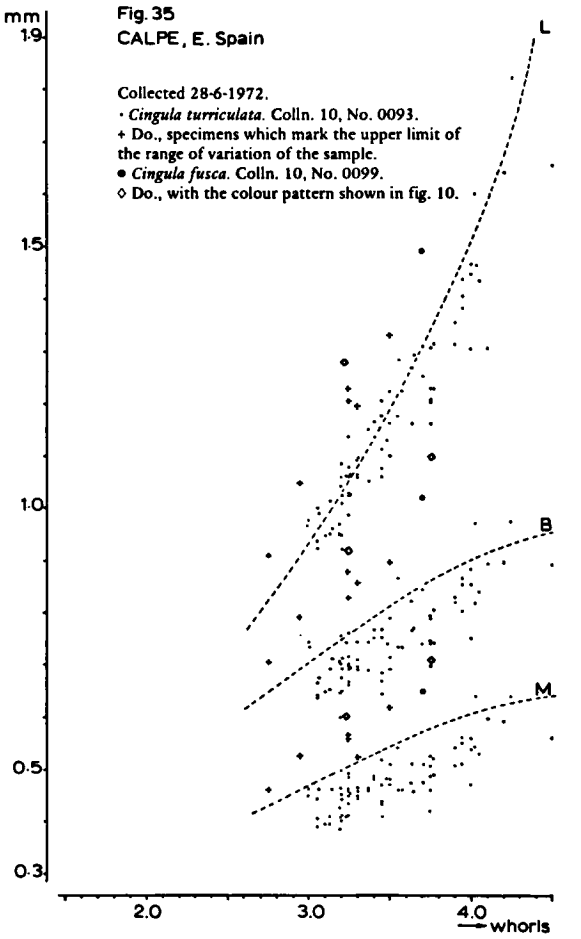


Fig. 35
CALPE, E. Spain

Collected 28-6-1972.
· *Cingula turriculata*. Colln. 10, No. 0093.
+ Do., specimens which mark the upper limit of the range of variation of the sample.
• *Cingula fusca*. Colln. 10, No. 0099.
◇ Do., with the colour pattern shown in fig. 10.

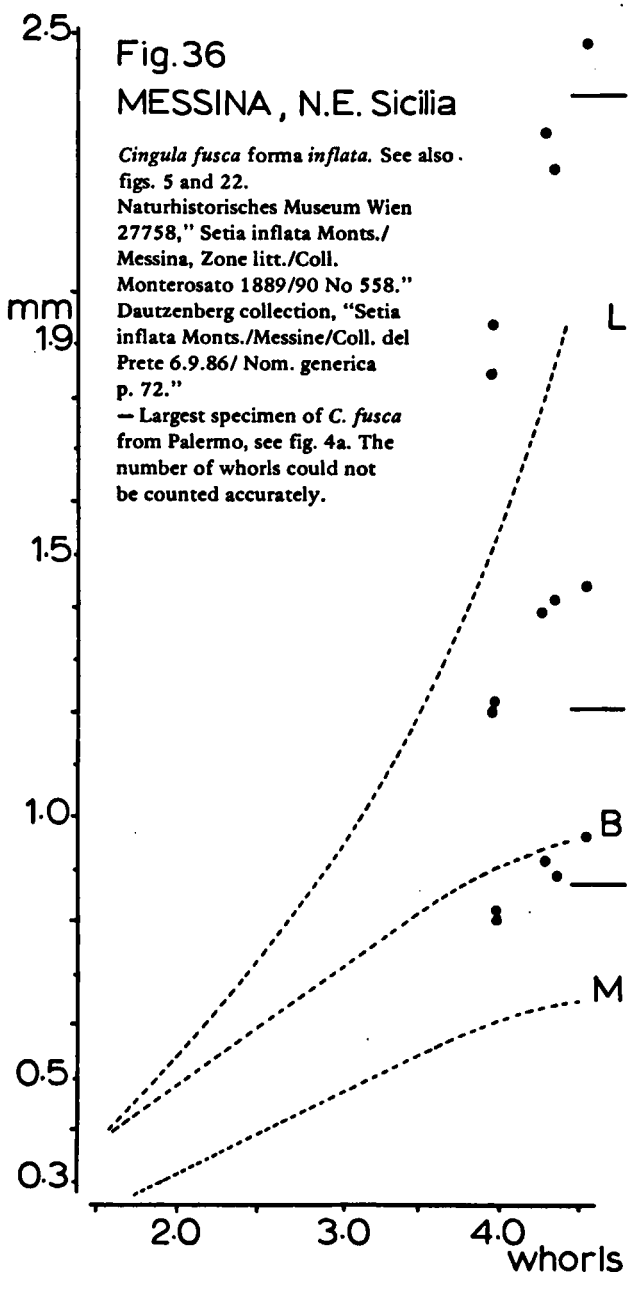


Fig. 36
MESSINA, N.E. Sicilia

Cingula fusca forma *inflata*. See also figs. 5 and 22.
Naturhistorisches Museum Wien 27758," Setia inflata Monts./ Messina, Zone litt./Coll. Monterosato 1889/90 No 558." Dautzenberg collection, "Setia inflata Monts./Messine/Coll. del Prete 6.9.86/ Nom. generica p. 72."
— Largest specimen of *C. fusca* from Palermo, see fig. 4a. The number of whorls could not be counted accurately.