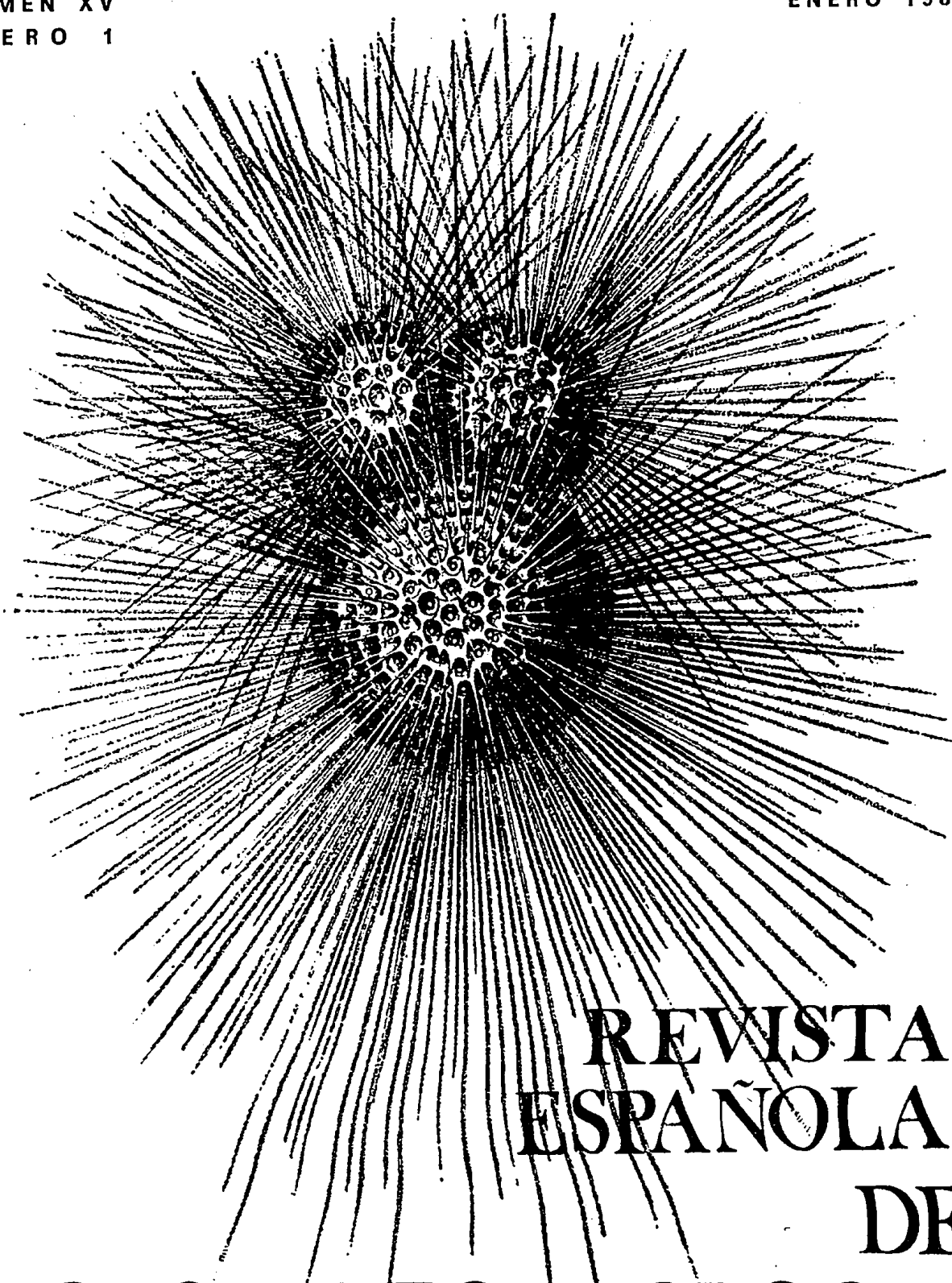


VOLUMEN XV
NUMERO 1

ENERO 1983



REVISTA
ESPAÑOLA
DE
MICROPALEONTOLOGIA

EMPRESA NACIONAL ADARO
DE INVESTIGACIONES MINERAS, S. A.

M. G. ANANTHA PADMANABHA SETTY,
National Institute of Oceanography, Dona Paula 403 004, Goa, India

ON THE VALIDITY OF DISCOCYCLINA RAMARAOI SAMANTA, n. sp. 1967

Discocyclina ramaraoi described as a new species by Samanta in 1967 from the Discocyclinid limestone-Upper Marlstone of Pondichery formation (Upper Paleocene-Lower Eocene) of South India is compared with *Discocyclina boetonensis* (van der Vlerk) reported earlier by Setty (1964) and the trigonal *Discocyclina* sp. (Setty 1968). As *D. ramaraoi* Samanta n. sp. 1967 is conspecific with and only a junior synonym of *D. boetonensis*, it is suppressed on the basis of Law of Priority.

Se compara *Discocyclina ramaraoi* Samanta (1967), de las calizas de Discocyclinidos: —margas superiores, de la formación Pondichery (Paleoceno superior—Eoceno inferior) del sur de la India, con *Discocyclina boetonensis* (van der Vlerk) indicada anteriormente (1964) por Jetty y con la *Discocyclina* sp. «trigonal» de Jetty (1968). Al ser *D. ramaraoi* Samanta coespecifica y sinónimo junior de *D. boetonensis*, se ha suprimido, según la ley de prioridad.

INTRODUCTION

A new species of *Discocyclina*, *Discocyclina ramaraoi* was describe by Samanta (1967) from the Discocyclinid limestone-Upper Marlstone of Pondichery formation (Upper Paleocene-Lower Eocene) of South India (Rajagopalan 1965). Setty (1964) had described *Discocyclina boetonensis* (van der Vlerk) and *Camerina wadiatii* Davies from this formation. Again Setty (1968) reported and described the 'trigonal' form of *Discocyclina* as *Discocyclina* sp. from the above formation (and also the stratigraphic horizon) as referred by Setty in 1964 and Samanta (1967, p. 233). According to Samanta (1967, p. 240) there is only one species of *Discocyclina* in this formation, hence it necessitates that a proper assessment be made on the taxonomic nomenclature of a *Discocyclina* species (*D. boetonen-*

sis and *D. ramaraoi*) described differently by the two authors. (Though *D. furoni* was identified as a new species later by Samanta in 1968, it is of no consequence here).

The diagnostic characters of *Discocyclina boetonensis* (van der Vlerk) as described by Setty (1964) and *Discocyclina ramaraoi* Samanta (1967) are compared with that of the original author van der Vlerk, to finally, consider the validity of *D. ramaraoi* as a new species. Table 1 presents the measurements of the various features and plate 1 shows reproductions of nucleonch of all the three.

COMPARISONS AND DISCUSSION

Discocyclina boetonensis (van der Vlerk) as described by Setty (1964) has the following

diagnostic characters (briefly reproduced here):

Test discoidal to lenticular, granulate or papillate; a subspherical protoconch followed by a second larger (kidney-shaped) chamber (duteroconch) embracing the initial chamber; the equatorial chambers being arcuate to rectangular (or spatulate) to faintly hexagonal in shape arranged in concentric rings and alternating in different annuli; size of the chambers increase towards the periphery; rectangular lateral chambers; radial walls thin; annular stolons present at proximal ends; cribriform perforations in the chamber roofs; pillars distinct and terminate on the surface as papillae.

The diagnostic features of *Lepidocyclina (Isolepidina) boetonensis* as described by van der Vlerk, (described by Setty, 1964) as *D. boetonensis* (van der Vlerk) appearing in the «Catalogue of Foraminifera» (Ellis and Messina) reproduced briefly here are as follows:

Test small, lenticular, peripheral flange absent, more or less rounded columns spread over the whole surface, equatorial chambers hexagonal, radial and tangential, they increase in radial diameter towards periphery, lateral chambers at both sides of the equatorial chamber-layer increase, horizontal walls of lateral chambers thin.

According to Samanta (1967) the diagnostic features of *D. ramaraoi* (reproduced briefly here) are as follows:

Test lenticular to umbonate, surface papillate, embryonic chambers small and bilocular, the protoconch spherical to subspherical with a duteroconch, crescentic to reniform and unequally, convex, stoloniferous, the periembryonic chambers spatulate to rectangular in outline or radially tangentially elongate, the equatorial chambers are spatulate to square, frequently hexagonal and arranged in concentric annuli, the equatorial chambers increasing in radial diameter and in height, annular stolons situated at the proximal ends, and open rectangular lateral chambers between their roofs and floors are arranged in tiers.

Several efforts were made to study the original material of van der Vlerk. Dr. G. W. De Boer, Geologisch Instituut, Riksuniversiteit, Utrecht (written communication 1977) informed that Vlerk's original material was not available either at the Universiteit collection or at the Museum of Leiden where Vlerk worked. Another attempt made to correlate the Pondichery formation and deposits known to contain *Discocyclina boetonensis* in Indonesia failed as the stratigraphic information is also not traceable anywhere. The only data available is from the Catalogue of Foraminifera, hence the same is used here. Under the circumstances, when approached and discussed with the present data, Prof. Cole (written communication, 1978) agreed with the argument presented as hereunder.

Setty (1964) redesignated *Lepidocyclina (Isolepidina) boetonensis* van der Vlerk as *Discocyclina boetonensis*. Prof. Storrs Cole, Cornell University, New York, who examined the Indian material observed (written communication 1961) «... I am certain it is a *Discocyclina* of the kind with faint hexagonal shape of equatorial chambers», and «It is a *Discocyclina* similar to the American species *D. cristensis* (Vaughan)». The figured nucleoconch of the specimen (30 b and 58 a) of van der Vlerk (Catalogue of Foraminifera) is more nephrolepidine than an isolepidine type (see plate 1, fig. 1). Van der Vlerk, not only misidentified it as a *Lepidocyclina* but most probably depending upon his visual observation he also incorrectly placed it as isolepidine type. Therefore, it appears, that he preferred to give only the diameter of the nucleoconch as $\pm 280 \mu$ and thickness of the wall of the nucleonch as 15μ ; but if he had given measurements (of the diameters) of the protoconch and duteroconch separately, it would have cleared its status as not to isolepidine but to nephrolepidine type. Samanta (1967 p. 239) also agrees that this is a *Discocyclina* and refers it to as 'conspecific with *D. ramaraoi*'. But later he states that even if it is assumed that it is a *Discocyclina*, «*D. ramaraoi*... can very easily be distinguished by a number of morphological differences, the most important being the differences in the embryo-

nic and periembryonic chambers». Table 1 shows that it is incorrect. Again, in this connection, it is interesting to quote Prof. Cole (Op. cit.) who stated that, «... It belongs to the type described from Indonesia as *Lepidocyclina boetonensis* van der Vlerk. He (van der Vlerk) incorrectly placed this species in the genus *Lepidocyclina*... The specimens you sent may be *D. boetonensis* ...» and later Cole (personal communication, 1962) categorically stated that, «The *Discocyclina*, as I wrote you is near the Indonesian specimen named by van der Vlerk: *D. boetonensis*». Thus, it is indisputably a *Discocyclina* species as conceded by Samanta (1967, p. 239) and, therefore, a *D. boetonensis* (van der Vlerk) as confirmed by Prof. Cole and redesignated as such by Setty (1964). Hence all the three are similar and therefore one and the same.

As a better means of identifying the similarities of all the three and the trigonal form and compare them, a Plate and a Table are presented. Plate 1 presents the reproduction of illustrations of embryonic apparatus, split specimen, and transverse section of specimens of van der Vlerk, Setty and Samanta (ibid). It is very clear from the Plate that the equatorial sections of figures 1, 2, 4, 8, 9 and 10 are similar. (Any degree of variation that may seem to appear is obviously due to the degree of distortion caused by slight change in the angle of section cutting. As it is well known that no two sections of any identical specimens can produce mirror image replicas). The split specimen of figure no. 6 is comparable to be very similar. The transverse sections (figs. 3, and 5) are also alike in their shape and size of the nucleoconch, and rectangular lateral chambers. The nucleoconch of the transverse section in figure 1 (of van der Vlerk) is not very good for comparison, but that of text fig. 1 matches well with those of fig. 3 and 5 excepting the nucleoconch. The chamber alignment of the transverse section of the trigonal *Discocyclina* (fig. 11 and 12) is however comparable to fig. 3. The hexagonal chambers in equatorial sections of figures 1, 2, 4, 7, 8, 9 and 10 are very clear and they are very similar to each other. Also the hexagonal shape of the

split specimens (fig. 6) are found to be similar. Further, Table 1 indicates clearly that the characteristic features of all these three are very closely similar or within the phenotypic and ecophenotypic range of variation to size, shape, the measurements of the nucleoconch, thickness of the wall, near hexagonal shape, and size of the equatorial chambers and also in the rectangular thin-walled lateral chambers. Therefore, it can be stated that within the population of every species, the specimens encountered invariably show such variations.

Further it may also be stated that just the size of the test, diameter of the megalospheric apparatus, and the height of the chambers near the periphery are not sufficient enough to demand the erection of a new species, since such variations are fairly common within the population. There has to be more than this for the purpose. The comparisons among the three (Table 1 and Plate 1) clearly indicate that they are mainly gradational and the minor differences are more or less illustrative of the causative effect of the geographical variation and/or environmental conditions prevailed at that time which affected the growth and development of the foraminifera. Therefore, the argument put forth by Samanta (1967) in erecting it as a new species is not justified. Even if his argument, for a moment, is given any credence, it can be argued that, likewise, the 'trigonal' *Discocyclina* sp. (Setty, 1968, Samanta 1968) must necessarily be considered as a new species also. But Samanta (1968, p. 73-74) *per se* states that «...Setty (1966) reported the rare occurrence in the Pondichery formation of discocyclines having tests of strikingly unusual shape». Thus he has admitted that my specimens are discocyclines as those of his specimens. As these (Samanta's specimen) are only variants, they should not be considered as new species.

Since the specific affinity of trigonal form was not clear, it was left under an open nomenclature by the author. In this context, it is relevant to quote Prof. Cole (written communication 1966) who stated, «... these specimens are definitely abnormal growth forms of *Discocy-*

Dimensions	<u>Lepidocyclus</u> <u>boetonensis</u> van der Vlerk 1928 (Type specimen) ☆	<u>Discocyclus</u> <u>boetonensis</u> (van der Vlerk) Setty 1964 ☆☆	<u>Discocyclus</u> <u>ramaraoi</u> Samanta 1967 ☆☆☆	<u>Discocyclus</u> <u>boetonensis</u> (van der Vlerk) Setty 1968 (Trigonal Specimen) ☆☆☆☆
	RANGES			
Diameter of the test (mm)	1.5 - 2.5	1.5 - 2.5	1.6 - 2.4	1.75 - 2.25
Thickness of the test(max.)(mm)	± 0.7	0.75 - 1.2	1.0 - 1.15	Trigonal Ridges 1.12 - 2.13; 0.50 - 1.0
Embryonic Chambers (Equatorial Sections)			75(min)x110(max)	
Diameter of Protoconch (μ)		88(min)x110(max)	145 - 159 (max)	99 - 176
Diameter of dueteroconch (μ)		110(min)x165(max)	100(min)x157(max) 200 - 224(max)	
Distance across both Chambers (μ)	± 280	132 - 165	125 - 150	
Thickness of outer wall (μ)	15	11	7 - 16	11 - 22
(Vertical Sections)				
Length of Protoconch (μ)		132	125 - 160	
Height of Protoconch (μ)		66	66 - 125	
Length of both Chambers (μ)		176		
(Equatorial Sections)				
Periembryonic Chambers Number		11 - 16	14 - 21	
Radial diameter (μ)		18 - 22	14 - 25	
Tangential diameter (μ)		22 - 44	14 - 36	
Equatorial Chambers Near Centre				
Radial diameter (μ)	15	22	13 - 33	
Tangential diameter (μ)		33 - 41	16 - 33	
Near Periphery				
Radial diameter (μ)	45	33 - 44	25 - 40	
Tangential diameter (μ)		11 - 17	15 - 25	
(Vertical Sections)				
Lateral Chambers				
No. of tiers	± 15	4 - 13	8 - 14	9 - 11
Radial diameter (μ)	90	44 - 96	16 - 82	33 - 44
Tangential diameter (μ)	15	11 - 22	10 - 25	11 - 22

☆ From Catalogue of Foraminifera (Ed. Ellis & Messina)

☆☆ Setty, M.G. Anantha P., 1964, Internat. Geol. Congr. XXII Session, Section 3. Part 3. p. 104 - 109

☆☆☆ Samanta, B.K., 1967, Micropaleontology, V.13, No. 2, p. 233 - 242

☆☆☆☆ Setty, M.G. Anantha P., 1968, Geol. Sec. India. Mem. No.2, p. 130 - 135.

TABLE 1

A comparative representation of various features of Discocyclus boetonensis as referred by various authors.

clinal. One of the specimens you sent suggests that it may have developed the 'trigonal' shape because of the presence of two sets of embryonic chambers. This suggests to me that two nuclei were present. I would be inclined to identify these specimens as abnormal ones of *Discocyclina boetonensis* (van der Vlerk) (formerly *Lepidocyclina boetonensis*) as the internal structure, except for the irregularities, is the same. I suggest, moreover, that in this population of abnormal specimens, you should be able to find some normal specimens...». 'Certainly, I would not erect a new species for these specimens. All the evidence is that these are abnormal growth specimens of the species *D. boetonensis*'. This statement explains the taxonomic position of the 'trigonal' form of *Discocyclina* sp. (Setty 1968). In view of the above observation, the author refrained from erecting the 'trigonal' *Discocyclina* and also its normal lenticular type into a new species or subspecies.

Earlier, several reports of such variations from the normal to abnormal (trigonal) in specimens have been reported in other genera also. Brady (1884) records the occurrence of trigonal forms of *Marginopora* from the Pacific atolls; Berry (1931) illustrated trigonal forms of *Lepidocyclina* from Peru; Cole and Bridge (1953) reported and illustrated trigonal forms of *Lepidocyclina verbeeki* from Mariana Islands; and Cole (1957, 1963) reported trigonal forms of *Lepidocyclina (Nephrolepidina) verrucosa* Scheffen from Saipan, and *Lepidocyclina (Nephrolepidina) rutteni* van der Vlerk from Guam; Cushman (1929) reported the saddle-shaped test of *Lepidocyclina perundosa* Cushman of Eocene age from Cuba. In fact, other irregularities like having multiple sets of embryonic chambers being present in *Discocyclina* are reported by Cole (1963) and recently by Coleman (1963) in *Lepidocyclina undosa* from the Tertiary of British Soloman Islands. Therefore, considering the various paleoenvironmental conditions that prevailed during the transitional stage from limestone to marlstone, Setty (1968) observed that a few (5-10 per 100) of the discoidal *D. boetonensis* underwent deformation or specialisation to give rise to a 'trigonal' form.

D. ramaraoi is therefore, conspecific with *D. boetonensis* which has priority and that trigonal forms are either aberrant or spatially isolated subspecies. It would therefore be appropriate to note that the species reported by Samanta (1967) in the Pondichery formation and various other specified sources are all *D. boetonensis*.

CONCLUSIONS

The above discussion clearly demonstrates that:

(1) The *Discocyclina* species from the Discocyclinid limestone-Upper Marlstone of Pondichery formation of South India is a *Discocyclina boetonensis* (van der Vlerk) Setty (1964) and not *Lepidocyclina (Isolepidina) boetonensis* van der Vlerk as incorrectly designated by him.

(2) There are more similarities in the embryonic and perieubryonic chambers of *D. boetonensis*, and *D. ramaraoi* and the very minor variations may be more due to geographical and/or paleoenvironmental conditions.

(3) The 'trigonal' *Discocyclina* sp. (Setty 1968) is an abnormal form and a variant of *D. boetonensis*. Samanta (1968 p. 73) admits that the 'trigonal' type is «identical with *D. ramaraoi* in such diagnostic internal features as the megalospheric embryonic apparatus and the equatorial chambers», and a variant.

(4) Therefore *D. ramaraoi* may be considered as a junior synonym of *D. boetonensis*, hence *Discocyclina ramaraoi* Samanta, n. sp. 1967 be rejected on the basis of Law of Priority.

ACKNOWLEDGEMENTS

The author is grateful to Dr. W. Storrs Cole, Emeritus Professor of Geology, Cornell University, New York for examining the Indian material earlier and his remarks, and again offering valuable suggestions while preparing the present manuscript; Dr. Le Ron E. Bielak of AMOCO (USA) and to Dr. R. C. Tjalsma of Circo (USA) for critical reading of the manuscript and va-

uable suggestions for improvement; and to the Director, National Institute of Oceanography for permission to publish this paper.

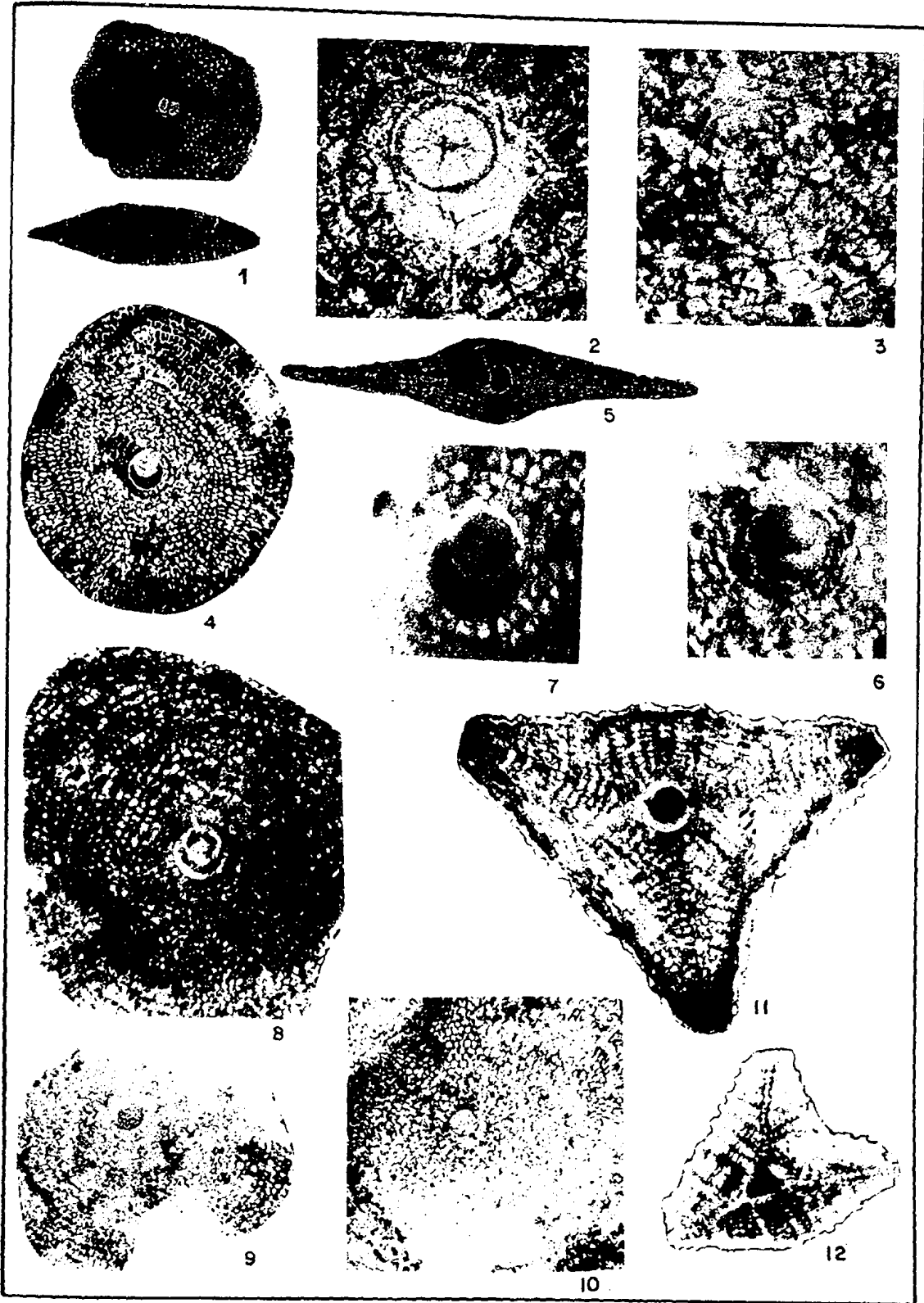
REFERENCES

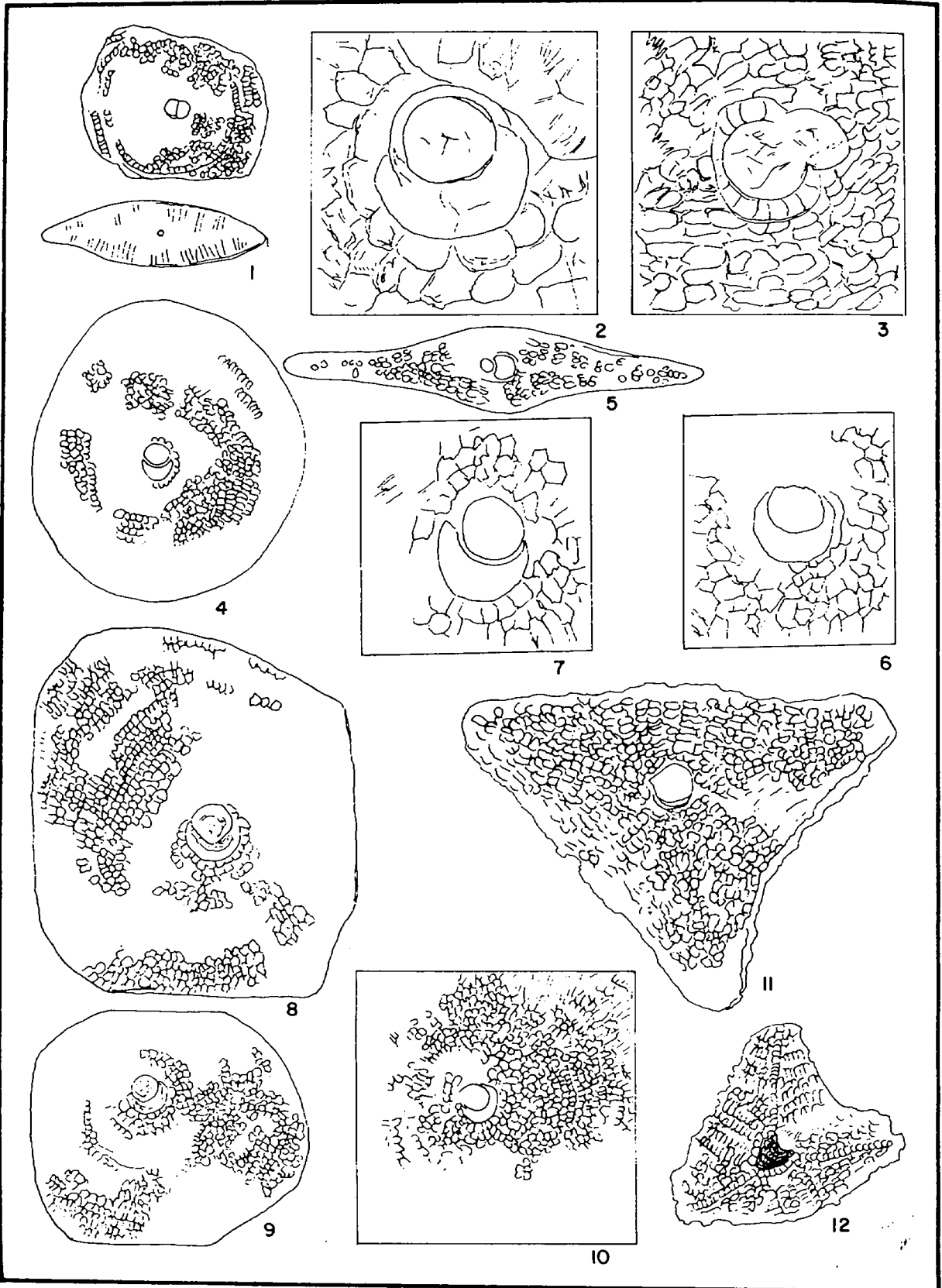
- BERRY E. W.
1931 *The Larger Foraminifera from Peru*. *Eclog. Geol. Helv.*, Vol. 24, No. 2, pl. 5, figs. 6-8.
- BRADY H. B.
1976 *Report on the foraminifera dredged by H. M. S. Challenger during the year 1873-1876*. *Rep. Voy. «Challenger»*, Zoology, Vol. 9, pl. 17, figs. 1, 3, 4 & 5.
- COLE W. S.
1953 *Criteria for the recognition of certain assumed Camarinid genera*. *Amer. Paleontology Bull.*, Vol. 35, No. 147, pp. 29-46, pls. 3.
1957 *Larger Foraminifera*. In: *Geology of Saipan, Mariana Islands, Part 3, Paleontology*. U. S. Geol. Survey Prof. Paper, 280-I, p. 321-360, pl. 109, figs. 6.
1963 *Tertiary larger foraminifera from Guam*. U. S. Geol. Survey Prof. Paper 403-E., pl. 11, fig. 1.
- COLE W. S., BRIDGE J.
1953 *Geology and Larger Foraminifera of Saipan Island*. U. S. Geol. Survey Prof. Paper, 253, 45 p., 15 pls., 5 tables.
- COLEMAN P. J.
1963 *Tertiary large foraminifera of the British Solomon Islands, Southwest Pacific*. *Micropaleontology*, Vol. 9, No. 1, p. 1-38, pl. 1-9.
- RAJAGOPALAN M.
1965 *Late Cretaceous and early Tertiary Stratigraphy of Pondichery, South India*. *Jour. Geol. Soc. India*, Vol. 6, p. 108-121.
- SAMANTA B. K.
1967 *Discocyclina from the early Tertiary sediments of Pondichery, south India*. *Micropalaeontology*, Vol. 13, No. 2, p. 233-242, pl. 1.
1968 *Discocyclina from Pondichery, south India*. *Cushman Found. Foram. Res. Contr.* Vol. 19, Part 2, p. 20-74, pl. 1.
- SETTY M. G., ANANTHA P.
1964 *Occurrence of Discocyclina boetonensis and Camerina wadiaii near Pondichery, south India*. 22nd Inter. Geol. Congr. Part 3, Sec. 3, p. 104-109, pl. 1.
1966 «Trigonal» *Discocyclina sp. from the Pondichery formation, Pondichery, south India*. *Geol. Soc. India, Bull. Spl. Number, Volume of Abstracts*, p. 26.
1968 «Trigonal» *Discocyclina from the Pondichery formation, Pondichery, south India*. *Seminar Cretaceous-Eocene Formations of South India*. *Geol. Soc. India Mem. No. 2*, p. 130-135, figs. 2.
- VLERK I. M. VAN DER
1928 *The genus Lepidocyclina in the Far East*. *Eclog. Geol. Helv.*, Vol. 21, p. 182-211, pls. 6-23, tables 3.

Manuscrito recibido el 5-VI-1981

PLATE 1

1. Reproduction of illustrations of specimen of *Lepidocyclina boetonensis* van der Vlerk (as shown in Catalogue of Foraminifera) x 320.
- 2-3. Reproduction of illustrations of nucleoconch of specimen of *Discocyclina boetonensis* (van der Vlerk) Setty 1964 (as shown in Sec. 3, Part 3, International Geological Congress, pl. 1, figs. 2-3, p. 106, 1964) x 180.
- 4-5. Reproduction of illustrations of *Discocyclina ramaraoi* Samanta 1967 (as shown in *Micropaleontology*, Vol. 13, No. 2, pl. 1, p. 241, figs. No. 9, 18), figs. 4,5, x 45.
6. Split specimen (equatorial section) of *Discocyclina boetonensis* showing entire nucleoconch and chambers x 90.
- 7-10. Equatorial sections of *Discocyclina boetonensis* from the same horizon (as referred to in Sec. 3, Part 3, Internat. Geol. Congress., p. 104-105, 1964) fig. 7, x 105, and figs. 8-10, x 72.
- 11-12. Equatorial section of «Trigonal» *Discocyclina sp.* (= *Discocyclina boetonensis*) from the same horizon, as referred to in figs. 2-3 and 7-10, fig. 11,12, x 72.





Reproduction of Plate 1 highlighting details with India Ink drawing.