

Agglutinated foraminiferids from the Visakhapatnam Harbour channels, East Coast of India

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Abstract

44 agglutinated foraminiferid species and subspecies have been identified from the Visakhapatnam harbour channel sediments, east coast of India. Twenty-four of them have not been reported by earlier workers who studied the foraminiferid assemblages of similar hyposaline environments located to the south and north of Visakhapatnam harbour. Five of them, however, are known from the shelf sediments off the east and west coasts of India.

Introduction

Foraminiferid assemblages consisting of 24 agglutinated and 115 calcareous species have been reported from the Gosthani, Tandava and Suddagedda estuaries, the Pudimadaka and Chipurupalle streams, Dummulapeta creek, and Kakinada channel, east coast of India (Nageswara Rao, 1979; Venkata Rao, 1972; Venkata Rao and Subba Rao, 1974, 1976a, b). In an investigation of the channels of Visakhapatnam Harbour Complex which is located in the same geographic region as the above water bodies, the authors have recognized as many as 24 agglutinated foraminiferid species which have not been reported from this geographic region or other parts of the Indian coast by earlier workers. It is the purpose of this note to illustrate these species and to point out their significance in our studies on Recent foraminiferids from the coastal marine regime of the Indian subcontinent.

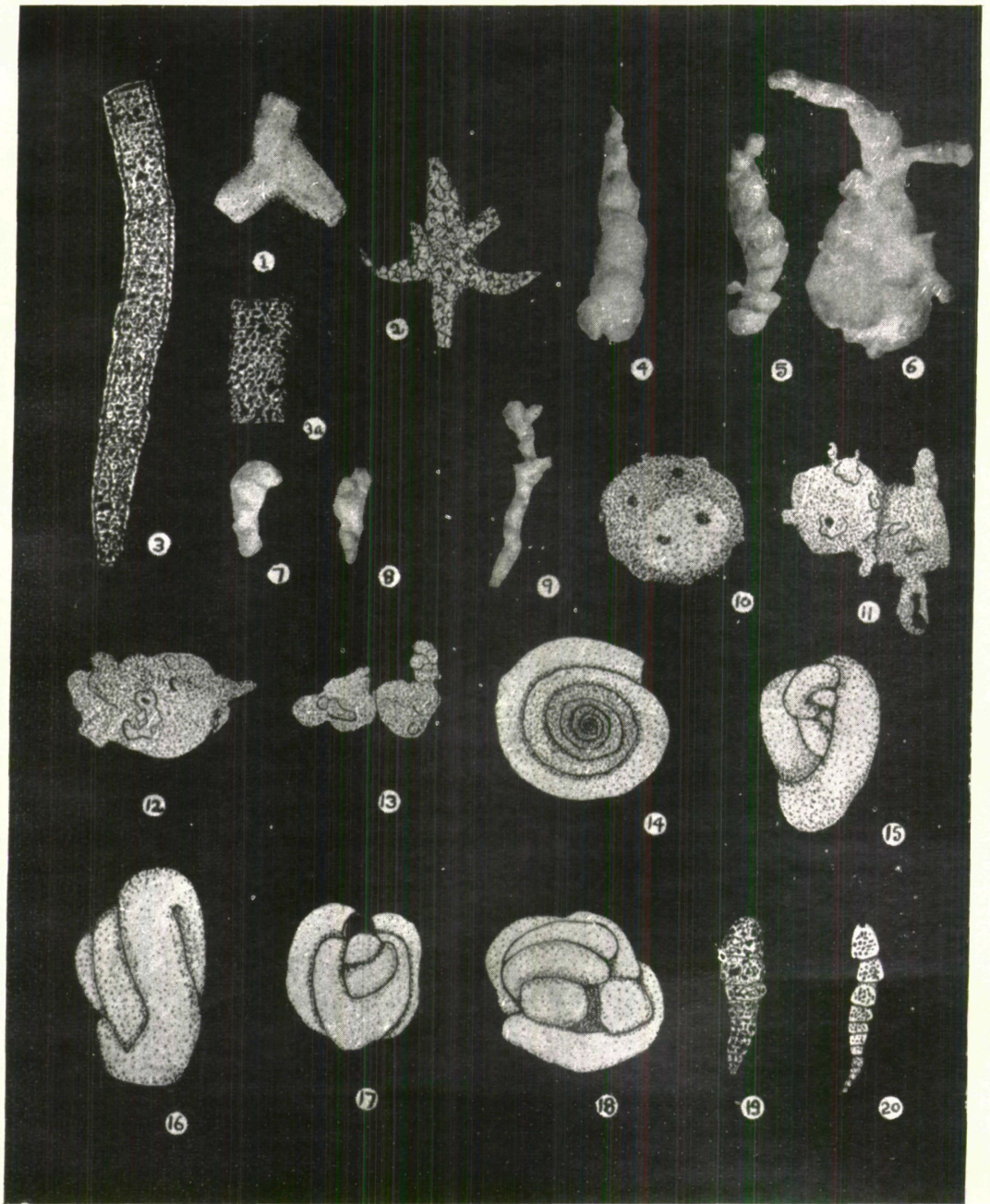
Results

The following 20 agglutinated species have been observed to be restricted in their occurrence to the marginal marine environments between Bheemunipatnam and Kakinada:

Ammonoastuta inepta Cushman and McCulloch, *Ammobaculites agglutinans* (d'Orbigny), *A. dilatatus* Cushman and Bronnimann, *A. directus* Cushman and

EXPLANATION OF PLATE I

1. *Rhabdammina abyssorum* Sars. $\times 27$.
2. *Rhizammina algaeformis* Brady. $\times 29$.
- 3 & 3a. *Testulosiphon indivisa* (Brady). Fig. 3. $\times 32$; Fig. 3a. $\times 30$.
- 4 & 5. *Pelosina variabilis* Brady. Fig. 4. $\times 54$; Fig. 5. $\times 40$.
6. *Pelosina rotundata* Brady. $\times 98$.
- 7 & 8. *Pelosina cylindrica* Brady. $\times 41$.
9. *Pelosina* sp. $\times 38$.
10. *Thurammina papillata* Brady. $\times 105$.
- 11-13. *Thurammina* sp. Fig. 11. $\times 26$; Fig. 12. $\times 42$; Fig. 13. $\times 34$.
14. *Ammodiscoides* sp. $\times 94$.
- 15 & 16. *Glomospira gordialis* (Parker and Jones). Fig. 15. $\times 104$; Fig. 16. $\times 102$.
- 17 & 18. *Glomospira* cf. *charoides* (Jones and Parker). Fig. 17. $\times 113$; Fig. 18. $\times 76$.
19. *Reophax nana* Rhumbler. $\times 92$.
20. *Reophax scottii* Chaster. $\times 88$.



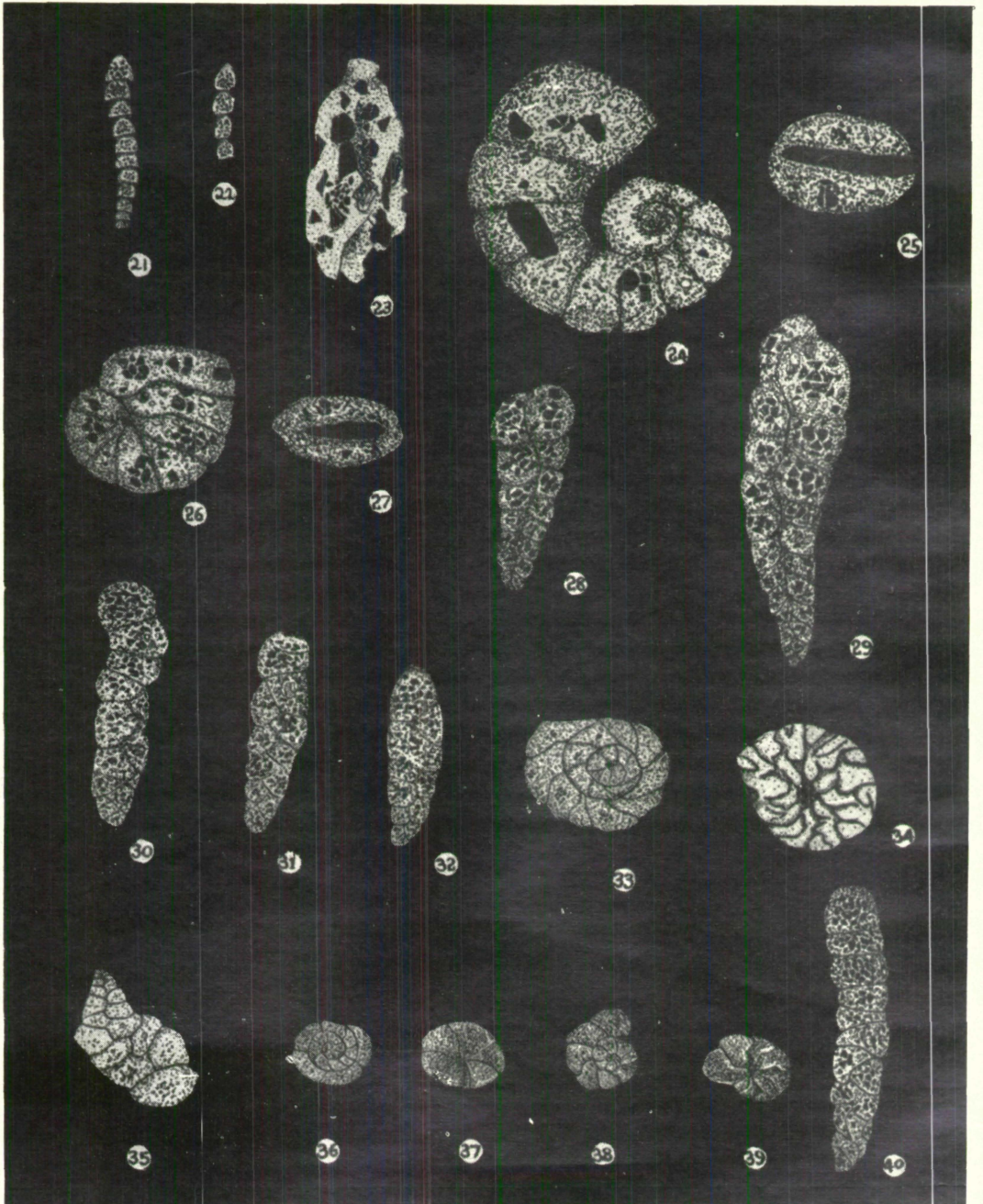


TABLE I. Occurrence of agglutinated foraminiferids

Species	Visakhapatnam Harbour	Gosthani estuary	Pudimadaka stream
*1. <i>Ammobaculites americanus</i>	×	×	×
2. <i>Ammodiscoides</i> sp.	×		
*3. <i>Asterotrochammina delicatula</i>	×		
*4. <i>Bigenerina cylindrica</i>	×	×	
5. <i>Glomospira gordialis</i>	×		
6. <i>G. cf. charoides</i>	×		
7. <i>Globotextularia</i> sp.	×		
*8. <i>Martinottiella communis</i>	×	×	
*9. <i>Nouria polymorphinoides</i>	×	×	
10. <i>Pelosina cylindrica</i>	×		
11. <i>Pelosina rotundata</i>	×		
12. <i>Pelosina variabilis</i>	×		
13. <i>Pelosina</i> sp.	×		
*14. <i>Reophax gracilis</i>	×	×	×
*15. <i>Reophax nana</i>	×		
*16. <i>Reophax scottii</i>	×		×
17. <i>Rhabdammina abyssorum</i>	×		
18. <i>Rhizammina algaeformis</i>	×		
*19. <i>Testulosiphon indivisa</i>	×	×	×
*20. <i>Textularia earlandi</i>	×	×	×
*21. <i>Thurammina papillata</i>	×	×	
*22. <i>Thurammina</i> sp.	×	×	×
23. <i>Trochammina (Remaneica) helgolandica</i>	×	×	×
*24. <i>T. ochracea</i>	×	×	×

× indicates the presence of the species.

EXPLANATION OF PLATE II

- 21 & 22. *Reophax gracilis* Kiaer. Fig. 21. ×41; Fig. 22. ×56.
 23. *Nouria polymorphinoides* (Heron-Allen and Earland). ×97.
 24-27. *Ammobaculites americanus* Cushman. Fig. 24 & 25. ×101; Figs. 26 & 27. ×96;
 Figs. 35 & 27. apertural views.
 28 & 29. *Textularia earlandi* Parker. Fig. 28. ×105; Fig. 29. ×98.
 30-32. *Bigenerina cylindrica* Cushman. Fig. 30. ×86; Fig. 31. ×97; Fig. 32. ×97.
 33 & 34. *Asterotrochammina delicatula* Bermudez and Seiglie. ×102.
 35. *Glontextularia* sp. ×105.
 36 & 37. *Trochammina ochracea* (Williamson). ×107.
 38 & 39. *Trochammina (Remaneica) helgolandica* Rhumbler. ×115.
 40. *Martinottiella communis* d'Orbigny. ×91.

Bronnimann, *Ammotium cassis* (Parker), *A. salsum* (Cushman and Bronnimann), *Arenoparrella mexicana* (Kornfeld) emend Anderson, *Bigenerina irregularis* Phleger and Parker, *B. sp.*, *Eggerella advena* (Cushman), *Haplophragmoides hancocki* Cushman and McCulloch, *H. wilberti* Anderson, *Miliammina fusca* (Brady), *M. fusca* (Brady) var., *Reophax dentaliniformis* Brady, *R. sp.*, *Textularia agglutinans* var. *porrecta* Brady, *Tochammina advena* Cushman, *T. inflata* (Montagu) and *T. macrescens* Brady.

All these species, with the exception of *Ammonoastuta inepta*, *Ammotium cassis*, *A. salsum*, *Bigenerina irregularis*, and *Reophax sp.* have been recognized from the channels of Visakhapatnam Harbour Complex. In addition, 24 more agglutinated species have been identified from them. They are listed in Table I and illustrated in Plates I and II. The 13 species marked with an asterisk (Table I) are found in living condition while the rest of the 11 species only in dead state. *Bigenerina cylindrica*, the four *Pelosina* spp., *Reophax gracilis*, *R. nana*, *Textularia earlandi*, and the two *Thurammina* spp., are abundant; *Ammobaculites americanus*, and the two *Glomospira* spp. are common; and the rest of the species are rare.

In order to determine whether these 24 species are restricted in occurrence to the Visakhapatnam harbour channels or otherwise, sediment samples were collected from Gosthani estuary and Pudimadaka stream situated 30 km away to the north and south respectively from Visakhapatnam Harbour, and their foraminiferid fauna was examined. The presence in these two water bodies of the species under reference are also recorded in Table 1. It is found that 12 of the 24 species, *Rhabdammina abyssorum*, *Rhizammina algaeformis*, *Reophax nana*, the four *Pelosina* spp., *Ammodiscoides* sp., the two *Glomospira* spp., *Globotextularia* sp., and *Asterotrochammina delicatula* seem to be restricted in occurrence to the Visakhapatnam harbour channels which appear to support a greater agglutinated species diversity than either Gosthani estuary or Pudimadaka stream.

Sethulakshmi Amma (1958) and Kameswara Rao (1970) have reported *Rhabdammina abyssorum* and *Bigenerina cylindrica* from the Kerala coast and Gulf of Cambay respectively. *Reophax scottii* was reported from the Kerala shelf sediments (Antony, 1968) and *Textularia earlandi* from the Cochin lagoon (Ilse Seibold, 1975) and from Mandovi and Zuari estuaries, Goa, (Kameswara Rao, 1974), west coast of India. *Rhizammina algaeformis* was described by Ganapati and Satyavati (1958) from the Pentakota shelf sediments, east coast of India (depth: 30 fathoms). Thus the present paper is the first report of the occurrence of 19 additional agglutinated species in Indian waters and 24 species from the east coast marginal marine water bodies.

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