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long, curved feet with blade-like longitudinal ridges. It is noted that the imperforate cephalis of this species sometimes becomes exceptionally large and inflated (pl. 24, figs. 9, 18). A pronounced cephalocone (pl. 24, figs. 18; cf. Pessagno 1977b and Pessagno et al. 1986) was observed in this species.

*N. imperfossa* differs from *Napora comis*, n. sp., in possessing a relatively smaller test with a large imperforate subspherical cephalis. The two species are otherwise very similar. The present species appears to stratigraphically lower than *N. comis*.

**Etymology.***Imperfossus-a-um* (Latin, adj.), unpierced.

**Measurements** (μm): Holotype + 9 paratypes. See Text-figure 35 for explanation of system of measurements.

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**Type locality:** MX-84-8 (see Appendix I)

---

**PLATE 19**

Nassellariina from the Taman Formation.

1, 16. *Parivingula excelsa* Pessagno and Blome.  
MX-85-23, upper thin-bedded member. Scale = 150.0, 58.8 μm.

2, 11. *Archaeodictyomitra shengi*, n. sp.  
Paratypes; MX-85-23, upper-thin-bedded member. Scale = 81.0, 84.3 μm. See holotype on Plate 20.

3, 19. *Archaeodictyomitra sixi*, n. sp.  
MX-85-23, upper thin-bedded member. Scale = 71.4, 50.1 μm.

Paratypes: MX-84-8, lower Taman, Figs. 4, 17, 21 = same specimen; scale = 120.0, 61.2, 61.2 μm. Figs. 5, 14 = another specimen; scale = 97.8, 46.2 μm. Note the H-linked circumferential ridges.

6, 13, 18. *Parivingula* (?) *enormis*, n. sp.  
Paratype, MX-85-23, upper thin-bedded member, scale = 78.8, 43.4, 51.6 μm. Note irregular pore frames on the proximal portion of test.

7. *Hsuum* sp.  
MX-85-23, upper thin-bedded member, scale = 111.9 μm.

8. *Ristola* sp. A.  
MX-85-23, upper thin-bedded member, scale = 58.8 μm. Note the median row of nodes between nodose circumferential ridges on each chamber.

9, 12, 20. *Periprydium* sp. cf. *delicatum*, n. sp.  
Views of same specimen. MX-85-23, upper thin-bedded member. Scale = 127.8, 80.1, 56.7 μm. Pericephalic shell partially broken.

MX-85-23, upper thin-bedded member. Scale = 87.9, 61.8 μm.
Deposition of types: Fossil Depository of Nanjing Institute of Geology and Palaeontology.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian, insofar as known. Lower and upper members of Taman Formation, east-central Mexico. Text-figures 30 and 32.

**Napora** sp. cf. **heimi** Pessagno, Whalen and Yeh
Plate 25, figures 14, 20

Remarks: This form differs from **Napora heimi** Pessagno, Whalen and Yeh (1986, p. 40, pl. 10, figs. 8, 10-12, 17, 20, 24) in possessing a less massive and simpler horn. The two species are otherwise very similar.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. Rare.

**Napora** sp. cf. **lospensis** Pessagno
Plate 25, figures 6, 7

Remarks: This form differs from **Napora lospensis** Pessagno (1977a, p. 96, pl. 12, figs. 9, 10; also Pessagno et al. 1986, p. 42, pl. 9, figs. 11, 16) in possessing a much narrower thorax, as compared with the holotype of **N. lospensis** Pessagno. It is quite abundant in the upper thin-bedded member of the Taman Formation, east-central Mexico.

---

**PLATE 20**

Nassellariina from the upper thin-bedded member of the Taman Formation.

1.  **Archaeodictyomitra shengi**, n. sp.

2, 3, 16.  **Archaeodictyomitra wangii**, n. sp.
   MX-85-23. Fig. 2 = paratype; scale = 66.6 μm. Figs. 3, 16 = holotype; scale = 66.6, 44.1 μm.

4, 14, 20.  **Parvicingula (?)** sp.
   Views of the same specimen. MX-85-24. Scale = 81.0, 56.7, 38.1 μm. Note the short spines on all chambers except for apical test.

5, 6, 15, 22.  **Parvicingula(?) enormis**, n. sp.
   MX-85-24. Figs. 5, 22 = paratype; scale = 67.5, 47.4 μm. Figs. 6, 15 = holotype; scale = 81.0, 44.1 μm. Note the irregular outer layer of pore frames covering and obscuring apical two thirds of test. Regular circumferential ridges and 3-row-pore-frame pattern on each chamber are well developed on the distal portion of test.

7.  **Archaeodictyomitra** sp.
   MX-85-24. Scale = 72.3 μm.

8, 12, 18.  **Parvicingula** sp. cf. **jonesi** Pessagno.
   Views of the same specimen. Scale = 150.0, 86.1, 85.5 μm.

9, 10, 19.  **Archaeodictyomitra sini**, n. sp.
   MX-85-25. Figs. 9, 19 = holotype; scale = 61.2, 41.4 μm. Fig. 10 = paratype; scale = 60.0 μm; note the costal projections at distal end of test and the broken bars between those projections.

11, 13, 17, 21.  **Perispyndium** sp. cf. **delicatum**, n. sp.
   Views of the same specimen. MX-85-25. Scale = 139.5, 58.8, 58.8, 58.8 μm. Fig. 17 shows lateral view of pericephalic shell.
Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. Text-figure 30.

**Napora** sp. A
Plate 26, figure 8

Remarks: This form is distinguished by possessing a short, pointed, and basally very massive horn. Its cephalis is conical and completely covered with microgranular silica.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. Rare.

**Napora** sp. B
Plate 24, figures 8, 13; plate 25, figures 10, 18

Remarks: This form is distinguished by possessing a long and slender apical horn with three medium-length longitudinal ridges alternating with three similarly wide grooves.

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PLATE 21
Nasselliariina from the upper thin-bedded member of the Taman Formation.

1, 19. *Ristolae* sp. A.  
MX-84-13. Scale = 82.2, 57.6 μm. Note a median row of pointed nodes on each chamber between the circumferential ridges.

2, 22. *Parvicingula* sp. A.  

MX-85-23. Scale = 133.2, 92.4 μm. Compare moderately long, pointed apical horn with the rudimentary horn of *P. yehae* (pl. 22).

4, 8. *Ristolae* sp. B.  
Fig. 4, MX-85-12; scale = 306.0 μm. Fig. 8, MX-84-13; scale = 157.8 μm.

5, 6, 15, 16. *Perispyridium delicatum*, n. sp.  
Figs. 5, 16 = holotype; MX-84-13; scale = 153.9, 88.2 μm. Figs. 6, 15 = paratype; MX-85-12; scale = 151.5, 60.0 μm.

Holotype. MX-85-26. Scale = 78.6, 51.0 μm.

9, 23. *Ristolae* sp. C.  
MX-85-26. Scale = 83.7, 58.8 μm.

10, 11, 18. *Hsuum tamanense*, n. sp.  
Figs. 10, 18 = holotype; MX-85-26; scale = 66.6, 41.4 μm. Fig. 11 = nontype; MX-85-12; scale = 70.5 μm.

12, 21. *Parvicingula* sp. B.  
Views of the same specimen. MX-84-13. Scale = 90.3, 63.3 μm.

MX-84-13. Scale = 83.4 μm.

MX-85-12. Scale = 60.0 μm.
Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Lower and upper member of Taman Formation, east-central Mexico. Rare.

**NASSELLARIINA incertae sedis**

Genus *Andromeda* Baumgartner, in Baumgartner, De Wever and Kocher 1980

Type species: *Andromeda crassa* Baumgartner, in Baumgartner, De Wever, and Kocher 1980.

Remarks: The genus name *Andromeda* has been previously used by Agassiz (1884; refer to Neave 1939, p. 192), thus, they are possibly homonymous. This brief note is intended to bring this matter to the attention of the author of *Andromeda* Baumgartner (1980).

Range and occurrence: Lower to Upper Jurassic. Tethyan and Boreal Realms.

*Andromeda* sp.

Plate 26, figs. 13, 23

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. Rare.

---

**PLATE 22**

Nassellariina from the upper thin-bedded member of the Taman Formation.


Fig. 1 = holotype; MX-85-12; scale = 81.9 μm. Fig. 2 = paratype; MX-85-12; scale = 80.1 μm. Figs. 3, 21 = nontype; MX-85-18; scale = 81.0, 57.0 μm.

4, 14, 15. *Hsuum mclaughlinii* Pessagno and Blome.

Views of the same specimen. MX-85-12. Scale = 150.0, 60.0, 85.8 μm.

5, 6, 16, 20. *Parvicingula holdsworthii*, n. sp.

MX-85-18. Figs. 5, 20 = holotype; scale = 83.7, 58.8 μm. Figs. 6, 16 = paratype; scale = 79.5, 55.5 μm. Note the sharp-edged, blade-like, circumferential ridges.

7, 8, 13, 18. *Parvicingula yehae*, n. sp.

19. MX-85-18. Figs. 7, 13, 18 = holotype; scale = 81.0, 56.7, 56.7 μm. Figs. 8, 19 = paratype; scale = 81.0, 56.7 μm. Note the arrow-like apical test covered with microgranular silica, and a minute, rudimentary apical spine.

9. *Archaeodictyomitra wangi*, n. sp.

Nontype; MX-85-12. Scale = 62.7 μm.

10, 22. *Parvicingula(?) sp. cf. discors*, n. sp.

Views of the same specimen. MX-85-18. Scale = 64.5, 39.9 μm. Compare with *Parvicingula(?) discors*, n. sp. (figs. 1-3, 21).

11. *Parvicingula* sp. C.

MX-84-26. Scale = 58.8 μm.

12, 17. *Parvicingula* sp. A.

Views of the same specimen. MX-85-43. Scale = 86.1, 60.6 μm. Note the massive, short apical horn.
Genus *Perispyrium* Dumitrca 1978

Type species: *Trilochel(?)* ordinaria Pessagno 1977a.

Remarks: This genus occurs worldwide in the Jurassic strata of the Tethyan and Boreal Realms. Pessagno et al. (1984, 1987b) used its final occurrence to mark the top of Subzone 4 beta and its first occurrence to mark the base of Superzone 1. This study indicates that *Perispyrium* gradually decreases in abundance and diversity towards the top of Subzone 4 beta.

Range and occurrence: Superzone 1, Zone 1A, base of Subzone 1A2 to Zone 4, top of Subzone 4 beta; Aalenian to lower part of upper Tithonian. Boreal and Tethyan Realms.

*Perispyrium delicatum*, n. sp.

Plate 21, figs. 5, 6, 15, 16

Description: Cephalis small to medium in size, ellipsoidal, with small irregular pore frames. Peripheral latticed shell subtriangular, relatively wide, straight to slightly convex on sides, and composed of numerous delicate irregular pore frames. Apical and two primary lateral spines medium in length, pointed, triradiate in cross-section with three narrow longitudinal ridges alternating with three wide

---

**PLATE 23**

Nassellariina from the upper thin-bedded member of the Taman Formation.

1, 7, 8, 19, 20. *Loopus* (?) *probos*, n. sp.
   Figs. 1, 20 = holotype; MX-85-25; scale = 84.9, 60.0 μm. Figs. 7, 19 = paratype; MX-85-25; scale = 81.0, 60.0 μm. Fig. 8, MX-85-18; scale = 81.0 μm. Note the two rows of primary pores at test structures.

2, 3, 17, 22. *Loopus* (?) *campbellii*, n. sp.
   MX-84-13. Figs. 2, 17, 22 = holotype; scale = 87.6, 41.4, 41.4 μm. Fig. 3 = paratype; scale = 87.6 μm.

4, 10. *Loopus* (?) sp. cf. *campbellii*, n. sp.
   Fig. 4, MX-84-13; scale = 61.5 μm. Fig. 10, MX-85-12; scale = 85.8 μm.

5, 6, 13, 21. *Loopus primitius* (Matsuoka and Yao).
   Fig. 5, 21 = views of the same specimen; MX-85-12; scale = 70.2, 49.2 μm. Figs. 6, 13 = another specimen, MX-85-25; scale = 73.8, 41.1 μm. A single row of primary pores at all test structures and narrow fluted costae, each bifurcate at a primary pore to form a loop around the primary pore and giving rise to a new costa below the primary pore. This type of costal pattern is typical of *Loopus*.

9. *Loopus* sp. B.
   MX-85-24. Scale = 69.9 μm.

11, 15, 18. *Loopus* sp. A.
   MX-85-18. Scale = 84.6, 39.9, 59.4 μm. Note all pores on the test surface filled with microgranular silica.

12, 14, 16. *Minitius* sp.
   Views of the same specimen. MX-84-26. Scale = 132.3, 34.2, 30.6 μm. Fig. 14 shows 2-row-pore pattern, typical of this species. Fig. 16 shows pore pattern on interior of shell and internal septa.
longitudinal grooves; each spine greatly reduced in width within peripheral shell. Peripheral shell extending inwards onto cephalic area, tending to cover up cephalis and obscure pericephalic pores on two opposite surfaces. Commonly ten or more pericephalic pores present.

Remarks: Perispyridium delicatum, n. sp., differs from P. nitidum Pessagno and Blome (1982) in possessing a peripheral shell extending onto the cephalic area on well-preserved specimens, and by possessing smaller and more numerous pericephalic pores that are often obscured by extended pericephalic skeleton. The two species, however, are similar in that both possess a fragile-looking peripheral shell. It is noticed that Perispyridium nitidum Pessagno and Blome has been found in the Bathonian-Callovian strata of North America, whereas P. delicatum, n. sp., is found only in the upper Tithonian strata in North America. A morphological link between the two species has not been discovered in the intermediate strata.

The delicate pericephalic skeletons of Perispyridium delicatum, n. sp., are often broken on sides (see pl. 21, figs. 6, 15) or on the opposite surfaces (pl. 21, figs. 5, 16).

Etymology: Delicatus-a-um (Latin, adj.), soft, tender.

Measurements (μm): Holotype + 9 paratypes. WD = width of test along axis of apical spine; LG = length of apical spine.

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PLATE 24

Nassellariina from the lower massively bedded member of the Taman Formation. All specimens figured on this plate are from sample locality MX-84-8 (see Appendix I).

1, 2, 16, 20, 21. Syringocapsa lata, n. sp.

Figs. 1, 21 = paratype; scale = 127.8, 60.0 μm. Figs. 2, 16, 20 = holotype; scale = 116.4, 60, 60.9 μm. Note the outer layer of irregular pore frames on the apical test.

3, 17, 22. Podobursa tetracola Foreman.

Views of the same specimen. Scale = 136.5, 64.2, 91.8 μm. Note that the spines on the final inflated chamber are triradiate throughout.

4, 5, 11, 14, 15. Sethocapsa tripes, n. sp.

Figs. 4, 15 = paratype; scale = 80.1, 58.8 μm. Figs. 4, 11, 14 = holotype; scale = 91.5, 43.5, 55.8 μm.

6, 12. Podocapsa foremanae, n. sp.

Views of the same specimen; nontype. Scale = 116.4, 80.4 μm.

7, 23. Naporas sp. cf. nudis, n. sp.

Views of the same specimen. Scale = 55.5, 42.9 μm.

8, 13. Naporas sp. B.

Views of the same specimen. Scale = 79.5, 42.3 μm.

9, 10, 18, 19. Naporas imperfossa, n. sp.

Figs. 9, 18 = holotype; scale = 68.1, 43.8 μm. Figs. 10, 19 = paratype; scale = 54.9, 31.2 μm. Note the imperforate cephalis and a cephalocone present on the holotype (fig. 18).
Cotype localities: MX-84-13 and MX-85-12 (see Appendix I).

Deposition of types: Fossil Depository of Nanjing Institute of Geology and Palaeontology.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. California Coast Ranges. Text-figures 30 and 32.

*Perispyridium* sp. cf. *delicatum*, n. sp.
Plate 19, figures 9, 12, 20; plate 20, figures 11, 13, 17, 21

Remarks: This form differs from *Perispyridium delicatum*, n. sp., in possessing a pericephalic shell which is composed of relatively more massive skeletons and much larger and less numerous pore frames. However, the two forms are similar in that both possess a pericephalic shell which is composed of irregular pore frames and tends to cover up the cephalic area. It is, therefore, probable that the two species are closely related.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. Upper thin-bedded member of Taman Formation, east-central Mexico. Text-figure 30.

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PLATE 25
Nassellariina from the upper Tithonian strata of the Taman Formation.

1. *Podobursa polyacantha* (Fischli).
   MX-85-22; upper thin-bedded member. Scale = 133.2 μm.
2, 3, 21, 22. *Syringocapsa suavis*, n. sp.
24. MX-84-8; lower Taman. Figs. 2, 21, 24 = holotype; scale = 143.4, 82.2, 39.0 μm. Figs. 3, 22 = paratype; scale = 126.3, 60.0 μm.
4. *Syringocapsa* sp. A.
   MX-85-23; upper thin-bedded member. Scale = 73.8 μm. A *Vallupus* sp. attached on upper-left side.
5, 23. *Syringocapsa* sp. B.
   Views of the same specimen. MX-85-23; upper Taman. Scale = 87.6, 59.4 μm.
6, 7. *Napora* sp. cf. *lispensis* Pessagno.
   Fig. 6, MX-85-23; upper Taman; scale = 79.5 μm. Fig. 7, MX-85-4; upper Taman; scale = 80.7 μm.
   Views of the same specimen. MX-85-23. Scale = 150.0, 85.8, 85.8 μm.
   MX-85-23; upper Taman. Scale = 157.8 μm. Note the apical spine.
10, 18. *Napora* sp. B.
   MX-85-23; upper Taman. Scale = 74.1, 41.7 μm.
11, 12, 15, 16. *Napora cruda*, n. sp.
   MX-85-25; upper Taman. Figs. 11, 15 = paratype; scale = 80.1, 56.1 μm. Figs. 12, 16 = holotype; scale = 69.9, 55.5 μm.
   MX-84-8; lower Taman. Scale = 79.3, 42.9 μm.
19. *Podobursa* sp.
   MX-85-22; upper Taman; scale = 63.6 μm.
*Perispyridium neotamanense*, n. sp.
Plate 18, figures 3, 4, 8, 9, 11, 13, 15, 18, 19

*Description:* Cephalis subspherical to ellipsoidal, with small and irregular pore frames. Peripheral shell roundly subtriangular, medium in width, with well-developed rounded nodes at vertices of pore frames. Apical and two primary lateral spines relatively short, bluntly terminated, with three relatively wide, rounded longitudinal ridges alternating with three narrower and moderately deep longitudinal grooves. Eight to nine bars connecting peripheral shell with cephalis and separating small, rounded pericephalic pores.

*Remarks:* *Perispyridium neotamanense*, n. sp., differs from *P. tamanense* Pessagno and Blome (1982) in possessing a peripheral shell which is proportionately larger, less highly nodose and composed of smaller and more numerous pore frames, and by possessing three shorter, less massive and bluntly terminated spines. The two species are both described from the Taman Formation (east-central Mexico). *P. tamanense* Pessagno and Blome has not been observed in the upper Tithonian strata (Zone 4, Subzone 4 beta). It is possible, however, that the two species are phylogenetically related because of their generally similar morphology.

*Etymology:* Neo-, Greek prefix, new, + *tamanense* (Pessagno and Blome 1982).

*Measurements* (μm): Holotype + 9 paratypes. WD = width of test along axis of apical spine; LG = length of apical spine.

---

**PLATE 26**

*Nassellaria* from the upper thin-beded member of the Taman Formation.

1, 2, 19, 21.  
**Syringocapsa tamanensis**, n. sp.  
MX-85-18. Figs. 1, 19 = holotype; scale = 117.6, 58.2 μm. Figs. 2, 21 = paratype; scale = 127.2, 58.5 μm. A piece of dirt covering part of the apical test of paratype (fig. 2).

3, 20.  
**Syringocapsa suavis**, n. sp.  
*Views of the same specimen; nontype. MX-84-26. Scale = 125.1, 65.4 μm.*

4.  
**Podobursa polyacantha** (Fischill).  
MX-85-22. Scale = 136.5 μm.

5, 6, 17, 22.  
**Napora comis**, n. sp.  
Figs. 5, 22 = holotype; MX-85-25; scale = 87.6, 61.2 μm. Figs. 6, 21 = paratype; MX-85-26; scale = 117.6, 63.9 μm.

7, 11, 15.  
**Syringocapsa lata**, n. sp.  
*Nontypes. Fig. 7, MX-84-26; scale = 85.8 μm. Figs. 11, 15 = views of the same specimen; MX-85-18; scale = 90.0, 61.8 μm.*

8.  
**Napora** sp. A.  
MX-84-26. Scale = 64.8 μm.

9, 10, 18.  
**Podocapsa foremaniae**, n. sp.  
MX-84-26. Fig. 9 = paratype; scale = 116.7 μm. Figs. 10, 18 = holotype; scale = 89.1, 62.7 μm.

12, 16.  
**Podocapsa** sp. cf. *amphitreptera* Foreman.  
MX-85-26. Scale = 136.5, 76.8 μm. Note the short, blunt apical test.

13, 23.  
**Andromeda** sp.  
*Views of the same specimen. MX-85-12. Scale = 153.9, 87.6 μm.*

14.  
**Sethiocapsa tripes**, n. sp.  
*Nontype. MX-84-13. Scale = 90.9 μm.*
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Type locality: MX-84-8 (see Appendix I).

Deposition of types: Fossil Depository of Nanjing Institute of Geology and Palaeontology.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian, insofar as presently known. Taman Formation, east-central Mexico; Northern Tethyan Faunal Province. Text-figures 30 and 32.

*Perispyridium* sp. cf. *neotamanense*, n. sp.

Plate 18, figures 2, 16, 17

Remarks: This form differs from *Perispyridium neotamanense*, n. sp., in possessing a much narrower, more triangular peripheral shell. Both forms, however, are closely associated in the Taman Formation.

Range and occurrence: Zone 4, Subzone 4 beta; upper Tithonian. MX-84-8 (see Appendix I), in lower massively bedded member of Taman Formation, east-central Mexico.

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REFERENCES


Appendix I. Locality Description

Lithostratigraphy, biostratigraphy, and chronostratigraphy of the study area are discussed in Pessagno et al. (1987a) and under INTRODUCTION herein (see Stratigraphic Summary). In the descriptions to follow, the MX-85-series samples were collected by Dr. E. A. Pessagno, Jr. and the present author during 1985. Other samples were collected by Dr. J. F. Longoria and Dr. E. A. Pessagno, Jr., during 1962–1985. Taman-Tamazunchale area, San Luis Potosi. See Pessagno et al. (1987a, pp. 4, 5; Text-figures 1, 2 herein).

MX-84-8. Lower massive-bedded member of the Taman Formation. Medium to massive-bedded, medium gray, micritic limestone interbedded with thin-bedded shale and siltstone. Sample from medium-gray, micritic, ellipsoidal limestone nodule (61 x 45 cm). Section repeated by faulting. Zone 4, lowermost part of Subzone 4 beta; upper Tithonian. About 6 m (20 ft) below contact with upper thin-bedded member of Taman Formation. Just west of Longoria Station O. 0.6 km east of Kilometer Post 265 on Rt. 85 (Mexico, D.F.–Nuevo Laredo highway).

MX-85-4, A, B. Upper thin-bedded member of Taman Formation. Thin-bedded, medium to dark-gray micritic limestone interbedded with thick intervals of dark-gray, buff-weathering shale and siltstone bearing limestone nodules. A = a large limestone nodule (approx. 1 ft in diameter) in calcareous shale; B = a small limestone nodule in the same layer. Zone 4, Subzone 4 beta; upper Tithonian. About 16 m (54 ft) above contact with lower Taman. West flank of small syncline along new road north (above) Barrio de Guadalupe; beyond first major turn in road. About 1.09 km (0.65 mi) from new highway bridge over the Moctezuma River.


MX-85-22. Small limestone nodule 50 m (166.5 ft) above contact with lower Taman on east side of syncline; Zone 4, Subzone 4 beta; upper Tithonian.

MX-85-23, A, B. Samples A and B are small limestone nodules from the same bed. 63.7 m (209 ft) above contact with lower Taman on east flank of syncline. Zone 4, Subzone 4 beta; upper Tithonian.

MX-85-24. Small limestone nodule. 64.9 m (213 ft) above contact with lower Taman on east flank of syncline. Zone 4, Subzone 4 beta; upper Tithonian.

MX-85-25. Small limestone nodule. 67.3 m (221 ft) above contact with lower Taman on east flank of syncline. Zone 4, Subzone 4 beta; upper Tithonian.

MX-85-26. Same. 68.2 m (223.8 ft) above contact with lower Taman on east flank of syncline. Zone 4, Subzone 4 beta.

MX-85-27, A, B. Two small limestone nodules from the same bed. 70.0 m (229.8 ft) above contact with lower Taman on east flank of syncline. Zone 4, Subzone 4 beta; upper Tithonian.

MX-85-39. Upper thin-bedded member of Taman Formation. Thin-bedded, dark gray micritic limestone with relatively thick interbedded dark-gray shale and siltstone containing large, micritic limestone nodules. Zone 4, Subzone 4 beta; upper Tithonian. Rt. 85 (Mexico, D.F.–Nuevo Laredo highway). 1.6 km (0.99 mi) west of Taman.

MX-84-13. Upper thin-bedded member of Taman Formation. Thin-bedded, medium to darkgray micritic limestone interbedded with thick intervals of dark gray, buff-weathering shale and siltstone bearing limestone nodules. Sample
limestone nodules with well-preserved silicified Radiolarians. Zone 4, Subzone 4 beta; upper Tithonian. About 62 m (204 ft) above contact with lower Taman on east side of the same syncline as MX-85-4. 1.0 km (0.62 mi) from new highway bridge over the River of Moctezuma at second major bend in road. Note: This horizon is about 32 m (105 ft) above the occurrence of an ammonite tentatively identified by Dr. Arnold Zeiss (Universität Erlangen, Nuremberg) as *Hildoglochiceras* aff. *tenuecostatum* Collignon at MX-85-35. MX-85-35 is situated 30 m (96.8 ft) above the contact with the lower Taman on the east flank of the same synclinal structure.

MX-82-37, A-I. Thin-bedded, darkgray micritic limestone with thick interbeds of darkgray shale and siltstone bearing very abundant fist-sized limestone nodules. Zone 4, Subzone 4 beta. Axial zone of synclinal structure on east side of Barrio de Guadalupe. About 40 m (131 ft) above MX-84-13. Road north of (above) Barrio de Guadalupe; 0.94 km (0.58 mi) from new highway bridge over the River of Moctezuma.

MX-85-18. Upper thin-bedded member of Taman Formation. Thin-bedded, darkgray to black, micritic limestone with very thick intervals of buff-weathering siltstone and shale with rare limestone nodules. Sample from thin-bedded, black, micritic limestone bed. Zone 4, Subzone 4 beta (upper part); upper Tithonian. Locality occurs west of NE-SW trending fault. Down road about 40 m from MX-84-26 (see below). About 2.5 km (1.55 mi) from new highway bridge over the River of Moctezuma on road north of (above) Barrio de Guadalupe.

MX-84-26. Same as MX-85-18 lithologically, but containing large limestone nodules bearing *Salinites grassicostatum* (Imlay) (ammonites identified by Dr. Arnold Zeiss, Universität Erlangen, Nuremberg) and abundant silicified Radiolarians. Zone 4, Subzone 4 beta (upper part); upper Tithonian. Exposed west of prominent NE-SW trending fault. 2.57 km (1.6 mi) from highway bridge over the River of Moctezuma on new road north of (above) Barrio de Guadalupe. Note: Pimienta Formation s.s. exposed 0.48 km (0.3 mi) up road from MX-84-26; intervening interval covered. Huauchinango area, Puebla. See Pessagno et al., (1987a; Text-figure 1 herein; cf. Cantu Chapa 1971, fig. 1, area, Af.-1).

MX-85-43. Upper thin-bedded member of Taman Formation. Black, carbonaceous, thin-bedded micritic limestone with medium-bedded intervals of buff-weathering shale and occasional olistostromal masses. Subzone 4 alpha; upper Tithonian. At Cantu Chapa's (1971) locality Af. 1 ("*Suarites bituberculatum* Zone").

MX-84-38, A-E. Upper thin-bedded member of Taman Formation. Same lithology as MX-84-38. Zone 4, Subzone 4 alpha; upper Tithonian. About 61 m (200 ft) above Cantu Chapa's (1971) locality Af. 1 and above MX-85-43 (see above).
Appendix II. Sample Preparation

All samples used in this study are limestone or limestone concretions. These samples were treated with concentrated hydrochloric acid (HCl: 36 – 38%). Residues after acidizing were processed in a series of sieves comprising 40 (425 μm), 80 (180 μm) and 230 (63 μm) mesh sizes. Residues caught in the 80 and 230 mesh-size sieves were examined separately for Radiolaria.

The residues extracted from the Taman limestone are extremely dark and rich in organic matter. This makes it difficult to examine the delicate radiolarian structures. Hydrogen peroxide (H₂O₂) was then used to dissolve the dark organic matter on the radiolarian specimens. This process was conducted by boiling the limestone residues in H₂O₂ repeatedly for approximately 15 minutes each time.

Finally, the water floatation technique was employed to concentrate the radiolarian specimens in the residues. (1) placing the residue in a glass beaker; (2) gently adding water to the beaker, and (3) before most of the residue settles down, carefully emptying half (or so) of the content in the beaker into a sieve (230 mesh size). This process can be repeated several times. Better preserved radiolarian specimens are always sorted out by this process prior to poorly preserved ones.

The cleaning and concentration procedures in radiolarian sample preparation, as discussed above, are believed to be crucial to taxonomic and biostratigraphic studies.