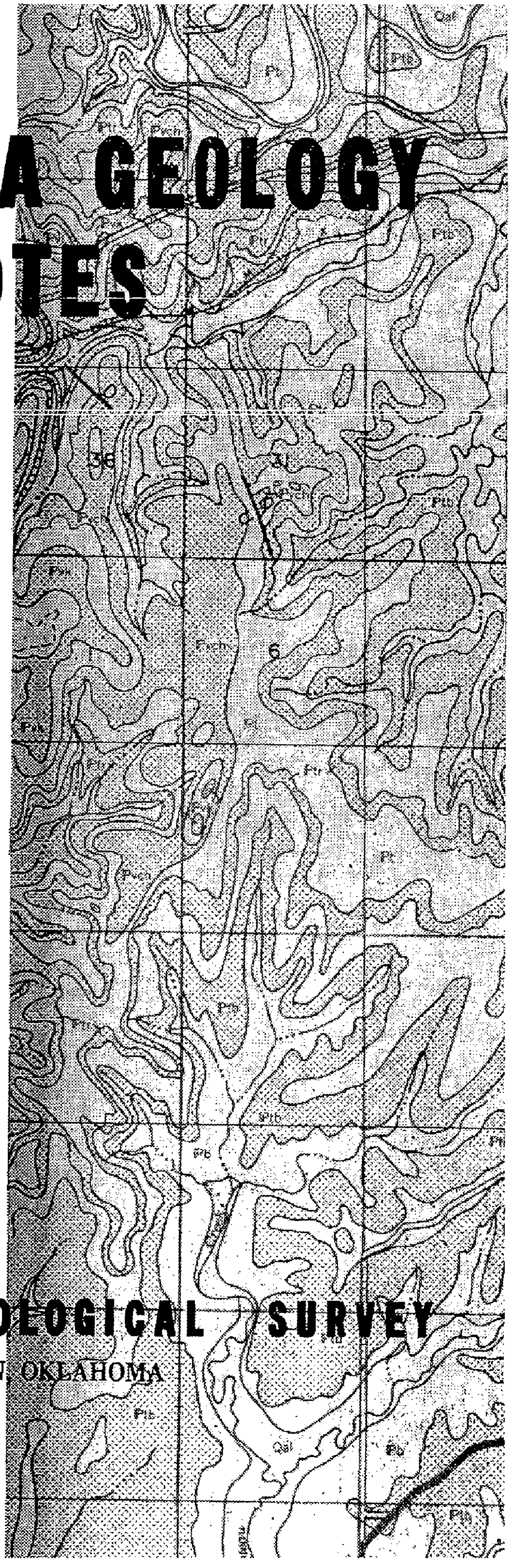
OKLAHOMA GEOLOGY NOTES



OKLAHOMA GEOLOGICAL SURVEY

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New Publications

Huffman, G. G., Geology of the south and west flanks of the Ozark uplift, northeastern Oklahoma. 281 pages, 22 figures, 16 tables, 6 maps (5 colored geologic maps, map of structural features). Oklahoma Geological Survey, Bulletin 77. Price $7.00 bound in blue cloth, paper $6.00.

Grandone, Peter, and Ham, W. E., The mineral industries of Oklahoma in 1956 and 1957. Oklahoma Geol. Survey, Mineral Report 34. 24 pages, 13 tables. Price $0.25.

Amsden, Thomas W., Stratigraphy and paleontology of the Hunton group in the Arbuckle Mountain region. Part II. Haragan articulate brachiopods. Part III. Supplement to the Henryhouse brachiopods. Part IV. New genera of brachiopods (Arthur J. Boucot and Thomas W. Amsden). Oklahoma Geol. Survey, Bulletin 78. 199 pages, 14 plates, 42 figures. Price bound in blue cloth $3.75, in paper $3.00.

STROMATOPOROIDEA

The name of the order means layered pore-bearing forms. J. J. Galloway of the University of Indiana has recently published his monograph on the morphology and classification of the stromatoporoids. They belong to the Class Hydrozoa and according to Galloway are found in rocks from Chazyan (Middle Ordovician) to late Devonian in age. The organisms were colonial and deposited calcareous matter in laminae, curved plates, and pillars.

Galloway divides the order into 5 families and 35 genera. He considers that the reported Mississippian genus (*Aphralysia*) is an alga. The reported Permian and Mesozoic genera he places in the order Sphaeractinoidea, considered to have descended from the Stromatoporoidea and to be ancestral to the Cretaceous to Recent order Hydroidea. Galloway refers *Aulocerium* to the bryozoan genus *Fistulipora; Caunopora* is a coral complex; *Diapora* is a commensual complex of corals and stromatoporoids; *Dictyostroma*, *Kentlandia*, and *Kitakamiia* are tabulate corals.

No stromatoporoid has been reported from Oklahoma, and specimens should be sought in the Simpson and Hunton groups.

The reference of late Paleozoic forms to the Sphaeractinoidea eliminates the forms listed by this reviewer from Permian rocks (Branson, Geol. Soc. America, Mem. 26, 1948, p. 115-117). *Araeopora* (2 species) and *Carnegiea* are tabulate corals; *Amphipora* and *Palaeoaplysina* are probably sponges; *Myriopora verbeeki* is probably an Upper Jurassic form of Sphaeractinoidea; the remaining ten genera and twelve species are members of the family Disjectoporidae, order Sphaeractinoidea.

Galloway rejects the name *Beatricea* Billings 1857 as a synonym of *Aulacera* Plummer 1843. The new genus *Cystostroma* is erected for two Middle Ordovician species. *Cryptophragmus* is considered a stromatoporoid of which most specimens consist only of the cystose column.

This excellent contribution to an understanding of a difficult group of organisms is "Structure and classification of the Stromatoporoidea", Paleont. Research Institution, Bulletins of American Paleontology, vol. 37, no. 164, p. 341-480, 7 plates, 1957.

PHOTOGRAPHIC ILLUSTRATIONS OF FOSSIL SPORE TYPES FROM IOWA

L. R. Wilson

In 1940 Wilson and Coe described and illustrated with line drawings four genera and eleven species of Paleozoic fossil spores. The types were at that time mounted in glycerine jelly or Diaphane. In the course of the eighteen years since they were prepared a number of the glycerine jelly mounts have channeled and the fossils have been destroyed. It has been possible to repair some of the slides and they should now remain relatively permanent. Since the fossils are types of important genera and species it is desirable to record them photographically even though they are not all in the same condition as when they were first illustrated.

All of the specimens have been remeasured and though most are the same as when originally reported several vary slightly. This is due probably to faulty optics. Shortly after the 1940 paper was published the microscope used in the study was found to be slightly out of alignment. The new measurements are recorded on the page containing the plate dscription.

In 1944, Schopf, Wilson and Bentall published an annotated synopsis of Paleozoic fossil spores and placed the genus *Phaseolites* Wilson and Coe in synonymy with the genus *Laevigatosporites* Ibrahim. The two species in the genus *Phaseolites* thus became *L. desmoinesensis* and *L. minimus* as new combinations. From the genus *Cirratriradites* the species *C. micropapillatus* became the genotype of a new genus *Lycospora*. Also into this genus was placed the species *C. minutus*. The results of a restudy of this second species indicates that it may be better at this time to retain that species in the genus *Cirratriradites* until a clearer statement is made concerning the spores of *Cirratriradites*. Within the genus there are several elements which can be separated from one another rather sharply. It might be best to retain those spore species simulating *C. maculatus*, the genotype, in the genus *Cirratriradites* and to erect at least one other genus to contain the others that are unlike it.

Two species of *Triquitrites* (*T. verrucosus* and *T. deltoides*) in the Wilson and Coe paper were transferred by Schopf, Wilson, and Bentall to *Granulatisporites*. One became *G. verrucosus* and the other *G. deltiformis*. The latter is a *nomen novum* since the name *G. deltoides* was already occupied.

In the genus *Endosporites* three species were originally described but a restudy of the material indicates that the species *E. pellucidus* does not have a well developed trilete mark and because of its shape and the proximal-distal association of the central body to the bladder it should have been transferred to the genus *Florinites* when Schopf, Wilson, and Bentall established that genus in 1944. The new combination is given below.

Florinites pellucidus (Wilson and Coe) Wilson, comb. nov.

Endosporites pellucidus Wilson and Coe, 1940. American Midland Naturalist 23: 184. Plate 1, fig. 3.

Literature

Schopf, J. M., L. R. Wilson, and Ray Bentall 1944. An annotated synopsis of Paleozoic fossil spores and the definition of generic groups. Ill. Geol. Survey. Rept. of Investigations—No. 91, p. 73. 3 pls., 5 figs.

Wilson, L. R. and E. A. Coe 1940. Descriptions of some unassigned plant microfossils from the Des Moines series of Iowa. Amer. Midland Naturalist, Vol. 23: p. 182-186. 1 pl.

Plate I Explanation

Fig. 1. *Endosporites angulatus* Wilson and Coe. Slide No. 183P-2. Diameter 102.5 mu, central body 50 mu. Size ranges, diameter 105-120 mu, central body 45-50 mu.

Fig. 2. *Endosporites ornatus* Wilson and Coe. Slide No. 161P-1. Diameter 92.5 mu, central body 67.5 mu. Size ranges, diameter 87-93 mu, central body 50 mu.

Fig. 3. *Florinites pellucidus* (Wilson and Coe) Wilson comb. nov. Slide No. 152P-2. Diameter 57.5 x 72.5 mu, central body 25 x 35 mu. Size ranges, 50 x 70 mu to 58 x 76 mu, central body 20 x 30 mu to 25 x 36 mu. Cotypes on slides 171-180 were not suitable for photography consequently a specimen from Slide No. 152 has been chosen for illustration. This specimen constitutes a lectotype since it came from the same preparation. It compares closely with the cotypes.

Fig. 4. *Laevigatosporites desmoinesensis* (Wilson and Coe) Schopf, Wilson, and Bentall. Slide No. 112P-1. Length 72.5 mu, width 30 mu. Size ranges, length 60-75 mu, side width 30-42 mu.

Fig. 5. *Laevigatosporites minimus* (Wilson and Coe) Schopf, Wilson, and Bentall. Slide No. 121P. Length 25 mu, width 16 mu. Size ranges, length 20-30 mu, side width 16-20 mu.

Fig. 6. *Lycospora micropapillata* (Wilson and Coe) Schopf, Wilson, and Bentall. Slide No. 152P-1. Diameter 22.5x27.5 mu, flange 1.5 mu. Size ranges, diameter 25-30 mu, flange 1-1.5 mu.

Fig. 7. *Cirratriradites maculatus* Wilson and Coe. Slide No. 136P. Diameter 82.5 mu, flange 12.5 mu wide. Size ranges, diameter 80-90 mu, flange 10-14 mu wide.

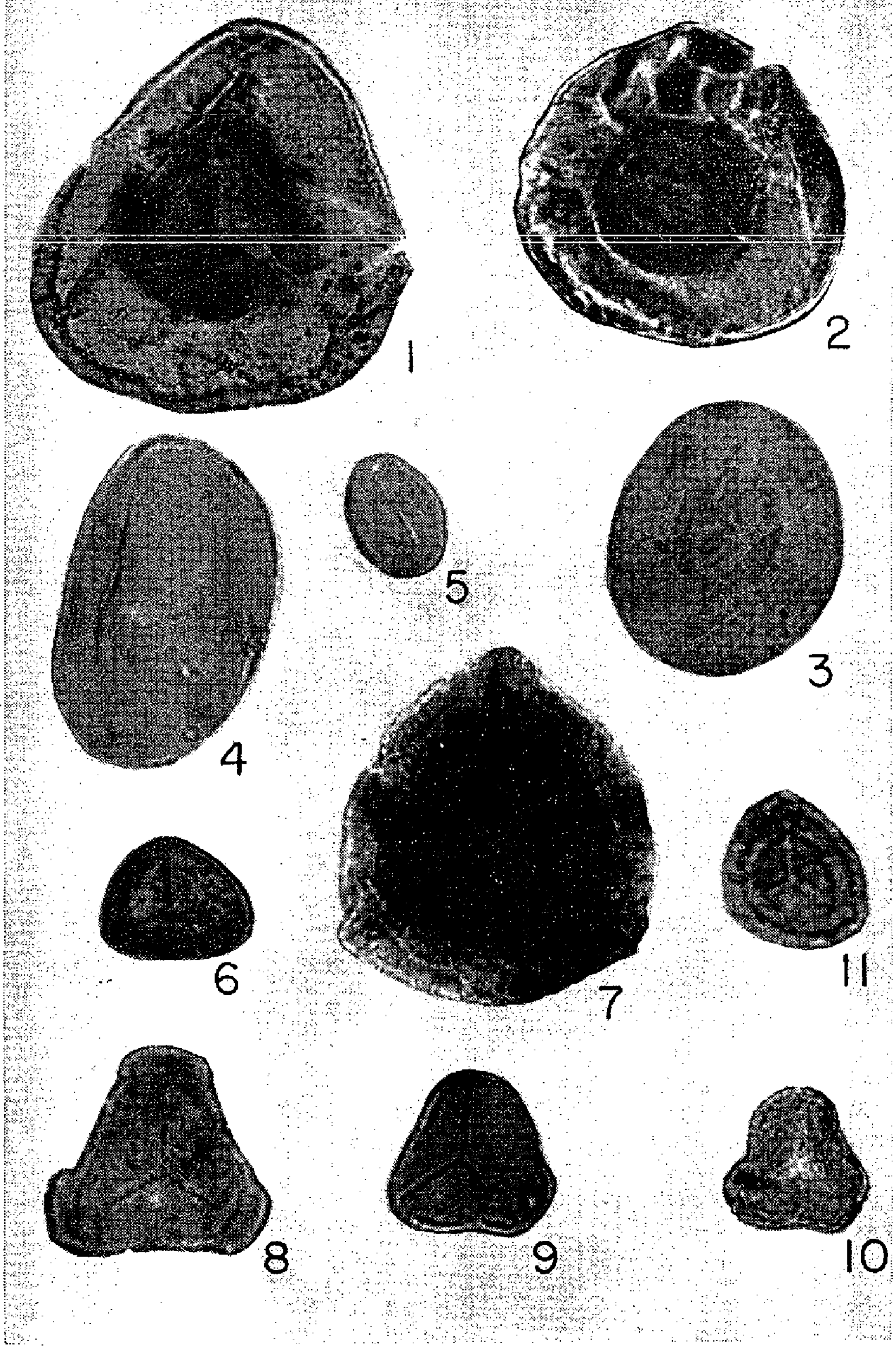
Fig. 8 *Triquitrites arculatus* Wilson and Coe, Slide No. 200-1. Diameter 42 mu. Size range, diameter 40-49 mu.

Fig. 9. *Granulatisporites deltiformis* Schopf, Wilson, and Bentall. (*Triquitrites deltoides* Wilson and Coe). Slide No. 193P-5. Diameter 35 x 37.5 mu. Size range, Diameter 26.5-37.5 mu.

Fig. 10. *Granulatisporites verrucosus* (Wilson and Coe) Schopf, Wilson, and Bentall. Slide No. 200P-5. Diameter 30 mu. Size range, 23-30 mu. A lectotype is used as an illustration for this species since none of the cotypes is suitable for photography.

Fig. 11. *Cirratriradites minutus* Wilson and Coe. (*Lycospora minuta* (Wilson and Coe) Schopf, Wilson, and Bentall). Slide No. 141P-1 Diameter 27 x 30 mu, flange 4-5 mu. Size ranges, diameter 25-30 mu, flange 4-5 mu.

Plate I



North American Pleistocene mammalian faunas, a review

DAVID B. KITTS

A recent paper by C. W. Hibbard (Summary of North American Pleistocene mammalian local faunas, Michigan Acad. Sciences, Arts, and Letters, Papers, vol. 43, pp. 3-32, 1958) presents a list of North American Pleistocene mammalian local faunas which he believes to have sufficient stratigraphic and faunal control to allow at least a tentative age determination. The paper also contains a systematic list of Pleistocene mammals showing their stratigraphic occurrence. Hibbard directs most of his attention to pre-Wisconsin faunas.

There are hundreds of localities in Oklahoma from which Pleistocene mammals have been obtained, but there are only two pre-Wisconsin localities which have yielded material in sufficient abundance and variety to allow age determination. The first of these localities is in the Holloman gravel pit situated about 2 miles north of the city of Frederick in Tillman County. The Holloman assemblage is not strictly speaking a local fauna, according to Hibbard, because it contains vertebrates of various ages. Hibbard believes that the topographic position, and the association of *Stegomastodon* and *Mammuthus* indicate that the older members of the fauna are of Kansan age.

Hibbard believes that the Berends local fauna, which was obtained from deposits above the Pearlette ash 4½ miles north and one mile west of Gate, Beaver County, is of Illinoian age. This age determination is based largely upon the presence in the fauna of the extinct beavers *Paradipoides stovalli* and *Castoroides* sp., and the stratigraphic position of the fauna above the Kansan Pearlette ash.

There will be those who disagree with Hibbard on some of his correlations, but all will agree, I believe, that the paper represents an extremely useful contribution, the first of its kind and scope in many years.

Petroleum and Radioactivity

Recently several articles have appeared in the chemical journals dealing with the use of radioactivity in the refining of petroleum, and telling of the changes in molecular structure of products due to their exposure to radiation. Presently attention is being given to the effects of radiation on those viscous crude oils which are difficult to remove from underground by either conventional primary or secondary recovery processes. According to George W. Crawford, University of Texas professor of physics and assistant director of the Texas Petroleum Research Committee, gamma radiation bombardment of heavy viscous crude "by injection of radioactive wastes is expected to break molecular bonds, thereby producing lighter molecules and decreasing viscosity". Secondary recovery methods could then be used to recover the oil. (Chemical Week, March 8, 1958).

Do you suppose that the variations in viscosity and composition of crude petroleum are the result, even partially, of differences in the amount of radioactive radiation to which the crude has been exposed in nature?

A. L. B.

A key to conodont genera and subgenera

By ROBERT O. FAY

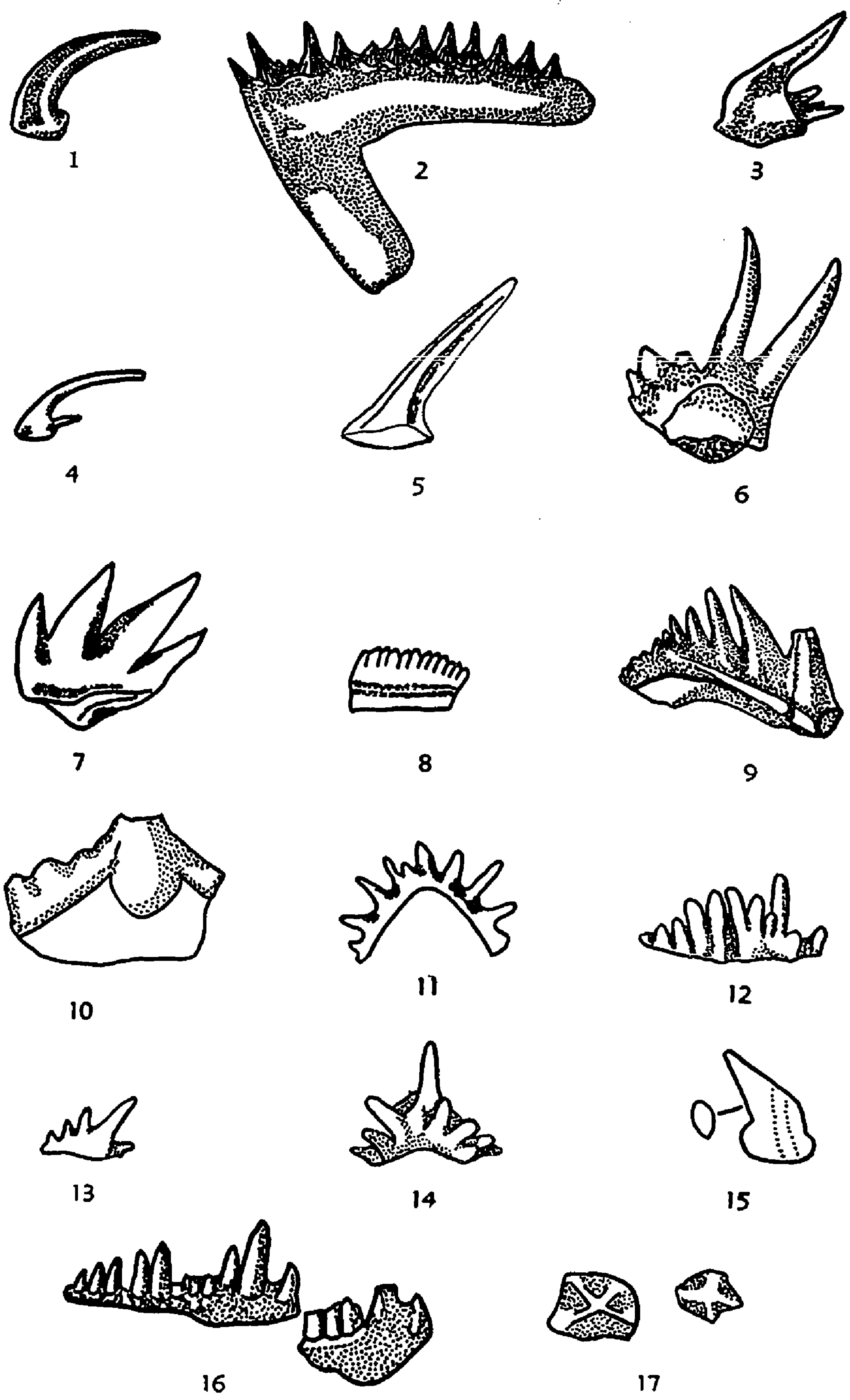
Since 1949, approximately 34 new genera have been proposed, several old genera emended or resurrected, and several subgenera created. In order to serve as an aid to teachers of micropaleontology, the intention of the author is to be objective and to use the characters of each genus as set down by the various workers on conodonts. After scan reading approximately 85 main articles published from 1949-1958, several conodont homonyms were noticed. The new names for these homonyms appear in this article but formal designations are reserved for an article to be published in the Journal of Paleontology.

The range of each genus or subgenus is not given because changes have been made in the concept of genera and approximately 355 new species have been described, thus altering old ranges as understood in 1949.

In order to understand the terms used in the key, it is advisable to refer to "Catalogue of conodonts" by R. O. Fay, University of Kansas, Paleontological Contributions, Publication 12, Vertebrata, Article 3, p. 1-206, figs. 1-109, December 1, 1952, Lawrence, Kansas. One alteration is necessary in order to remain consistent with reference to oral bar, lateral process, anterior, and posterior. In forms like *Hibbardella, Trichonodella, Keislognathus, Apatognathus, Tripodellus,* etc., with the posterior bar to the observer's right, the inner side is toward the observer, the outer side away from the observer, and the anterior side is to the left of the observer. The apical lamella would be the anterior process, and the oral bar the outer lateral process. The two main limbs in *Hibbardella* or *Trichonodella* and allied forms would be considered inner and outer lateral processes.

1. Fibrous conodonts -- 2
   Lamellar conodonts -- 18
2. Cones -- 3
   Blades, Bars, and Platforms -- 7
3. Simple cones -- 4
   Cones with additional denticles or lobes on base ---------------- 5
4. Escutheon absent ------------------------ *Stereoconus* (Fig. 1, x17)
   Longitudinally grooved escutcheon ------ *Archeognathus* (Fig. 2, x7)
5. One to 3 small denticles or lobes on base, no buttress ---------- 6
   Large denticles on base, buttress
   present on one side -------------- *Microcoelodus* (Fig. 3, x27)
6. Escutcheon present ------------------ *Multioistodus* (Fig. 4, x16)
   Escutcheon absent -------------------- *Mixoconus* (Fig. 5, x20)
7. Blades and bars -- 8
   Platforms -- 17
8. Escutcheon on side of unit, extending to aboral surface -------- 9
   Escutcheon on aboral surface or absent ------------------------ 10
9. Hand-shaped dental units; denticles discrete and
   subcircular in cross section -------- *Chirognathus* (Fig. 6, x34)
   Units as above; denticles laterally
   fused and bladelike ---------- *Leptochirognathus* (Fig. 7, x31)

10. Escutcheon deep 11
Escutcheon shallow or absent 15
11. Base straight in side view 12
Base arched at an obtuse angle in side view 14
12. Bladelike, thin crenulate oral edge .... *Coleodus* (Fig. 8, x17)
Bladelike, deeply notched oral edge 13
13. Main cusp on end, no buttress .... *Neocoleodus* (Fig. 9, x17)
Main cusp in middle with buttress .... *Microcoelodus* (Fig. 3, x27)
14. Buttress on both sides,
escutcheon moderately deep .... *Erismodus* (Fig. 10, x34)
Buttress on one side, escutcheon deep .. *Microcoelodus* (Fig. 3, x27)
15. Base strongly arched in side view .... *Curtognathus* (Fig. 11, x27)
Base straight in side view 16
16. Unit long, discrete
divergent denticles .... *Trucherognathus* (Fig. 12, x27)
Unit short, discrete
aligned denticles .... *Polycaulodus* (Fig. 13, x27)
17. One row of discrete aligned denticles,
not heart shaped in top view .... *Polycaulodus* (Fig. 13, x27)
Discrete divergent denticles,
heart shaped in top view .... *Cardiodella* (Fig. 14, x27)
18. Simple cones 19
Bars, Blades, and Platforms 34
19. Escutcheon present 20
Escutcheon absent .... *Clavohamulus* (Fig. 15, x37)
20. Escutcheon deep 21
Escutcheon shallow (form not well known,
may be fish jaw) .... *Prionognathodus* (Fig. 16, x9)
21. Low units, wider than high .... *Lepognathodus* (Fig. 17, x34)
High units, higher than wide or about high as wide 22
22. Unit about as high as wide .... *Sagittodontus* (Fig. 18, x50)
Unit higher than wide 23
23. Escutcheon almost twice as wide as high 24
Escutcheon about as high as wide 26
24. Bilaterally symmetrical units 25
Bilaterally asymmetrical units,
one side grooved, other smooth .... *Paltodus* (Fig. 19, x27)
25. Lower anterior margin rounded, not
indented, not extended aborally;
posterior concave to keeled, lateral
faces smooth .... *Acontiodus* (Fig. 20, x34)
Lower anterior margin indented, extended aborally; posterior side
may be sharp, lateral faces may
have ridges .... *Ulrichodina* (Fig. 21, x44)
26. Bilaterally asymmetrical units 27
Bilaterally symmetrical units 28
27. One lateral face has narrow ridge,
other is flat or concave .... *Acodus* (Fig. 22, x27)
One lateral face has wide convex ridge,
other is convex .... *Scandodus* (Fig. 23, x25)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28. Anterior margin projects aborally
into a prong ____________________ *Distomodus* (Fig. 24, x17)
Anterior margin without aboral prong ____________________ 29

29. Lateral faces grooved __________________ *Scolopodus* (Fig. 25, x27)
Lateral faces ridged or smooth ______________________________ 30

30. Base of cone sharply extended
posteriorly and laterally ____________ *Oistodus* (Fig. 26, x34)
Base of cone not as above ________________________________ 31

31. Small denticles present on posterior margin
of cone proper (not on base) _____ *Acanthodus* (Fig. 27, x20)
Denticles absent on posterior margin of cone proper __________ 32

32. Lateral faces with ridge ______________ *Distacodus* (Fig. 28, x27)
Lateral faces smooth ____________________________________ 33

33. Sharp anterior and posterior edges _____ *Drepanodus* (Fig. 29, x27)
Cross section round or elliptical __________ *Oneotodus* (Fig. 30, x65)

34. Bars, without inner and outer lateral processes
together, with discrete denticles; with or
without main cusp, with main cusp on end
or in middle, and some genera with discrete
denticles on posterior or anterior margin of
base of simple cone ______________________________________ 35
Bars with inner and outer lateral processes to-
gether, Blades, and Platforms ___________________________ 66

35 Units without prominent main cusp _________________________ 36
Units with prominent main cusp ___________________________ 38

36. Outer lateral process present near anterior end,
S-shaped in top view _________ *Centrognathodus* (Fig. 31, x17)
Lateral process absent, straight in top view _________________ 37

37. Straight in side view, posterior end
of bar denticulate ______________________ *Lonchodus* (Fig. 32)
Arched in side view, posterior end of bar
bar blunt, non-denticulate __________ *Prioniodella* (Fig. 3, x10)

38. Units with one prominent cusp, with smaller
denticles on the posterior edge of cone
proper; denticles may or may not extend
slightly to base ______________________________________ 39
Units without denticles on posterior edge of cone proper ________ 40

39. Denticles not on base,
inclined toward base ______________ *Acanthodus* (Fig. 27, x20)
Denticles extend to base, parallel with base __ *Belodus* (Fig. 34, x48)

40 One anterior denticle arises from base
(otherwise like *Drepanodus*) __ *Strachanognathus* (Fig. 35, x25)
No anterior denticles, or more than one arise from base ________ 41

41. Units without anterior process, lateral processes, and anticusp __ 42
Units with above features, or any of these in combination ______ 50

42. Posterior denticles present, in most genera on base of main cusp _ 43
Denticles absent, merely nodes on a
domelike bar, deep escutcheon ________ *Nericodus* (Fig. 36, x30)

43. Posterior denticles adjacent to main cusp
decrease in size posteriorly ____________________________ 44


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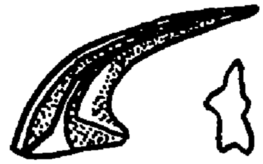
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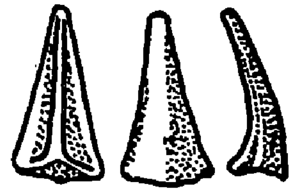
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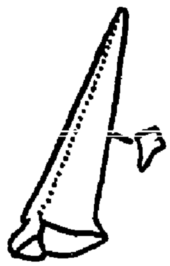
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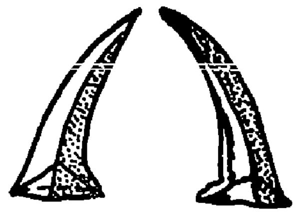
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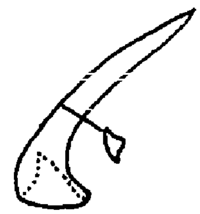
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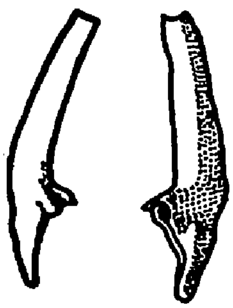
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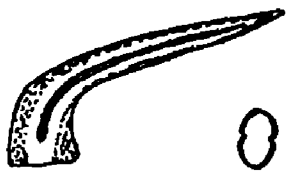
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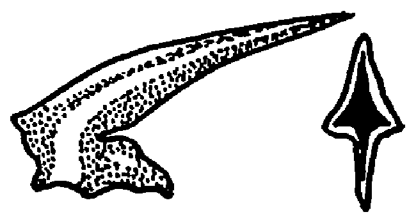
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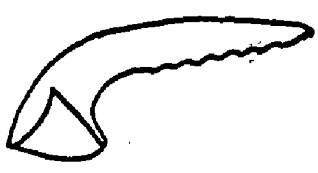
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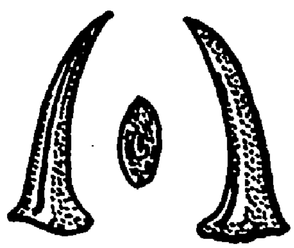
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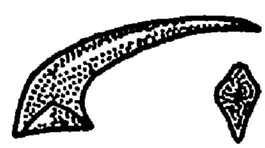
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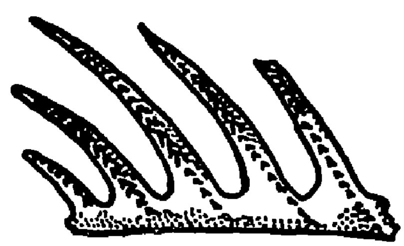
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Posterior denticles either not adjacent to main cusp, or if present, there is a distinctly large denticle (as large or larger than cusp) in middle of posterior denticles — 48

44. Posterior denticles on base of main cusp — 45
As above, but anterior denticles present on base — *Zygognathus* (Fig. 37, x25)

45. No posterior bar present — *Cordylodus* (Fig. 38, x34)
Posterior denticulate bar present — 46

46. Posterior bar thin, escutcheon deep — 47
Posterior bar thick, escutcheon shallow — *Cyrtoniodus* (Fig. 39, x40)

47. No ridge on inner lateral face and anterior margin — *Subcordylodus* (Fig. 40, x30)
Ridge on inner lateral face and anterior margin — *Gothodus* (Fig. 41, x30)

48. Large posterior denticle present — 49
Large posterior denticle absent — *Pachysomia* (Fig. 42, x27)

49. Anterior margin denticulate, cusp with outer lateral ridge — *Periodon* (Fig. 43, x30)
Anterior margin not denticulate, cusp with no ridge — *Phragmodus* (Fig. 44, x27)

50. Anterior process not denticulate — 51
Anterior process denticulate — 52

51. Main denticle wide, with slight backward curvature — *Neoprioniodus* (Fig. 45, x30)
Main denticle long, with sharp backward curvature — *Paracordylodus* (Fig. 46, x30)

52. Denticles on anterior process smaller than main cusp — 53
Denticle anterior to main cusp larger than main cusp — *Metalonchodina* (Fig. 47, x24)

53. Anterior process not in same plane as posterior bar — 54
Anterior process almost in same plane as posterior bar — 62

54. Long bar with alternating large and small denticles — 55
Denticles not as above — 56

55. Inner lateral process absent — *Hindeodella* (Fig. 48, x20)
Inner lateral process present — *Kladognathus* (Fig. 49, x40)

56. Bar with large flange on one side of main cusp; wide lamella connects the bar with the anterior process — 57
Bar without flange, lamellar connection present or absent — 58

57. Aboral surface laterally expanded — *Oulodus* (Fig. 50, x27)
Aboral surface thin, bladelike — *Gyrognathus* (Fig. 51, x30)

58. Lamellar connection absent — 59
Lamellar connection present — *Eoligonodina* (Fig. 52, x25)

59. Unit with anterior and posterior deflections — *Angulodus* (Fig. 53, x17)
Unit without deflections — 60

60. Anterior process arises from side of main cusp (45°), unit arched — 61
Anterior process arises from end of main cusp (90°), unit not arched — *Ligonodina* (Fig. 54, x20)

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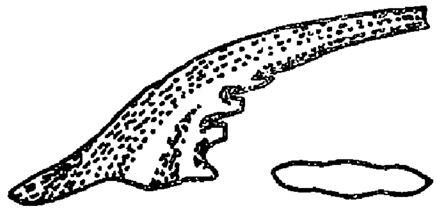

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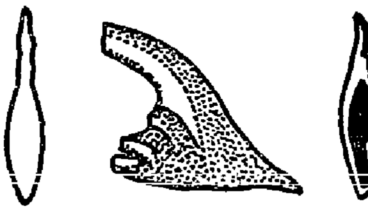

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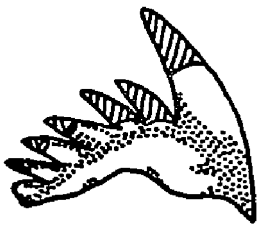

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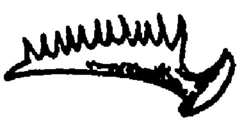

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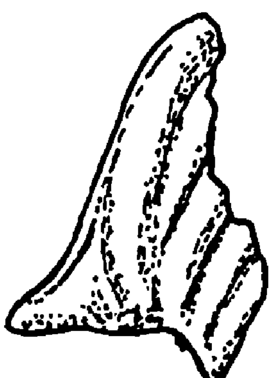

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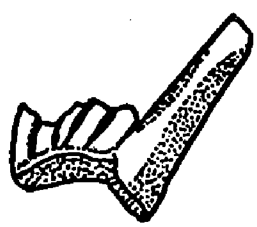

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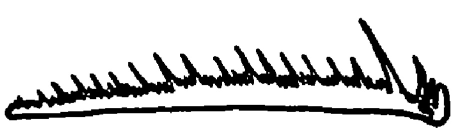

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61. Unit thickened laterally,
slightly arched ---------------------- *Geniculatus* (Fig. 55, x30)
Unit not thickened laterally,
strongly arched -------------------- *Lonchodina* (Fig. 56, x20)

62. Anterior process and posterior
bar short -------------------------- *Ptiloconus* (Fig. 57, x27)
Posterior bar long, anterior process short or long -------------- 63

63. Inner lateral process present ------------ *Prioniodus* (Fig. 58, x30)
Inner lateral process absent ------------------------------------ 64

64. Main cusp long, directed
upward or forward ------------- *Euprioniodina* (Fig. 59, x20)
Main cusp wide, directed backward --------------------------- 65

65. Anticusp short, unit sharply arched ---- *Neoprioniodus* (Fig. 45, x30)
Anterior process long or short,
unit gently arched ---------------- *Prioniodina* (Fig. 60, x20)

66. Blades, without inner and outer lateral processes present together; main cusp may be on end or in middle, denticles bladelike. Inner lateral process may be present ---------------------------- 67
Blades and bars with inner and outer lateral processes present together, and platforms --------------- 95

67. Main middle cusp present ------------------------------------ 68
Main middle cusp absent ------------------------------------- 88

68. Posterior and anterior limbs
not denticulate --------------------- *Cornuramia* (Fig. 61, x27)
Either or both limbs denticulate ----------------------------- 69

69. Anterior limb denticulate, posterior
limb not denticulate ------------------ *Falodus* (Fig. 62, x34)
Anterior and posterior limbs denticulate ------------------------ 70

70. Unit S-shaped in top view ------------ *Pravognathus* (Fig. 63, x44)
Unit not S-shaped in top view -------------------------------- 71

71. Unit with both anterior
and posterior deflections -------------- *Falcodus* (Fig. 64, x13)
Unit may have one deflection but not two -------------------- 72

72. Limbs short and high -------------------------------------- 73
Limbs more elongate -- 74

73. Unit strongly arched ---------------- *Palmatodella* (Fig. 65, x20)
Unit not arched ------------------- *Pinacognathus* (Fig. 66, x15)

74. Unit strongly arched ------------------------------------- 75
Unit gently arched or not arched ----------------------------- 78

75. Inner lateral process present ------------ *Prioniodus* (Fig. 58, x30)
Inner lateral process absent ---------------------------------- 76

76. Main cusp recurved backward ------------------------------- 77
Main cusp not recurved backward ---- *Synprioniodina* (Fig. 67, x27)

77. Escutcheon shallow, main cusp large --*Neoprioniodus* (Fig. 45, x30)
Escutcheon thin, long, deep,
main cusp small --------------- *Subbryantodus* (Fig. 68, x27)

78. Escutcheon thin, long, deep ---------------------------------- 79
Escutcheon shallow, with slight pit beneath main cusp ---------- 82


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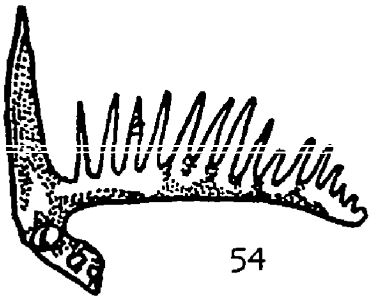
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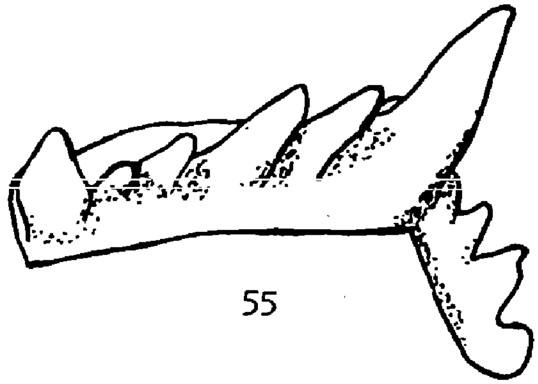
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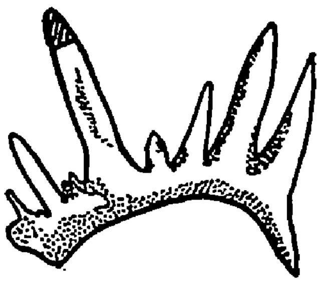
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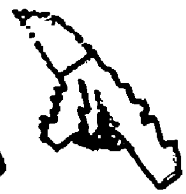
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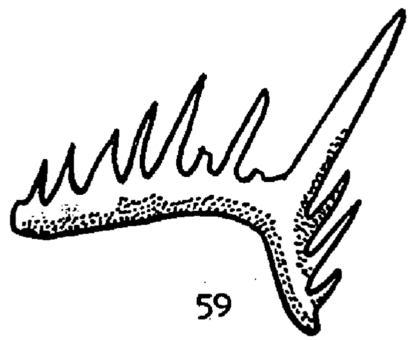
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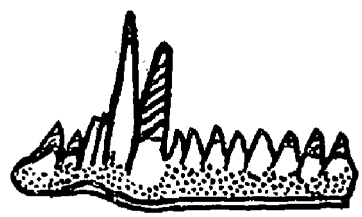
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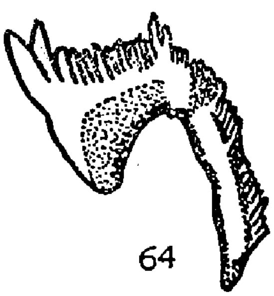
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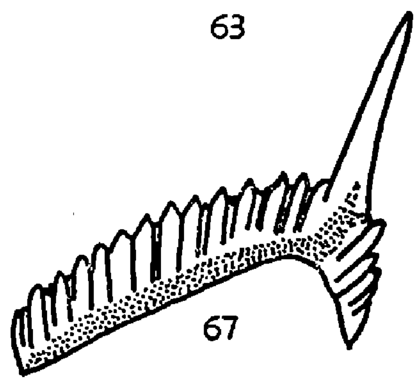
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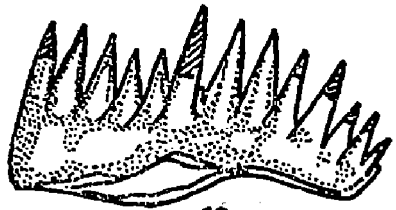
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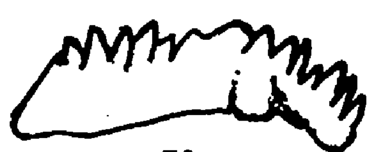
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79. Escutcheon not expanded much
beneath main cusp .... *Subbryantodus* (Fig. 68, x27)
Escutcheon much expanded beneath main cusp 80

80. Limbs off-set laterally 81
Limbs not off-set laterally .... *Bryantodina* (Fig. 69, x80)

81. Denticles blunt, basal
expansion gentle .... *Aphelognathus* (Fig. 70, x25)
Denticles sharp, basal
expansion sharp .... *Dichognathus* (Fig. 71, x28)

82. Aboral edge blunt 83
Aboral edge sharp 87

83. Basal flanges developed on
both sides of unit .... *Bryantodus* (Fig. 72, x20)
Flanges expanded laterally into plates 84

84. Plates on one side developed more than
other, oral surface not concave 85
Plates developed same on both sides,
oral surface concave .... *Polygnathoides* (Fig. 73, x34)

85. Larger plate extends full length of unit 86
Larger plate does not extend full
length of unit .... *Nothognathella* (Fig. 74, x27)

86. Denticles subequal, unit very
gently arched .... *Solenodella* (Fig. 75, x15)
Middle denticles much higher than others,
unit more strongly arched .... *Polygnathellus* (Fig. 76, x20)

87. Posterior end of blade not flexed .... *Ozarkodina* (Fig. 77, x34)
Posterior end of blade flexed ...... *Plectospathodus* (Fig. 78, x34)

88. No anticusp present 89
Anticusp present 94

89. Units with sharply bowed end, no main
denticle present .... *Bactrognathodus* (Fig. 79, x34)
Units not bowed sharply, large denticle on end 90

90. Large, hornlike, isolated denticle on one end,
base platform-like with large pit ... *Pelekysgnathus* (Fig. 80, x34)
Subequal denticles, with ones near anterior end
slightly larger than the remainder 91

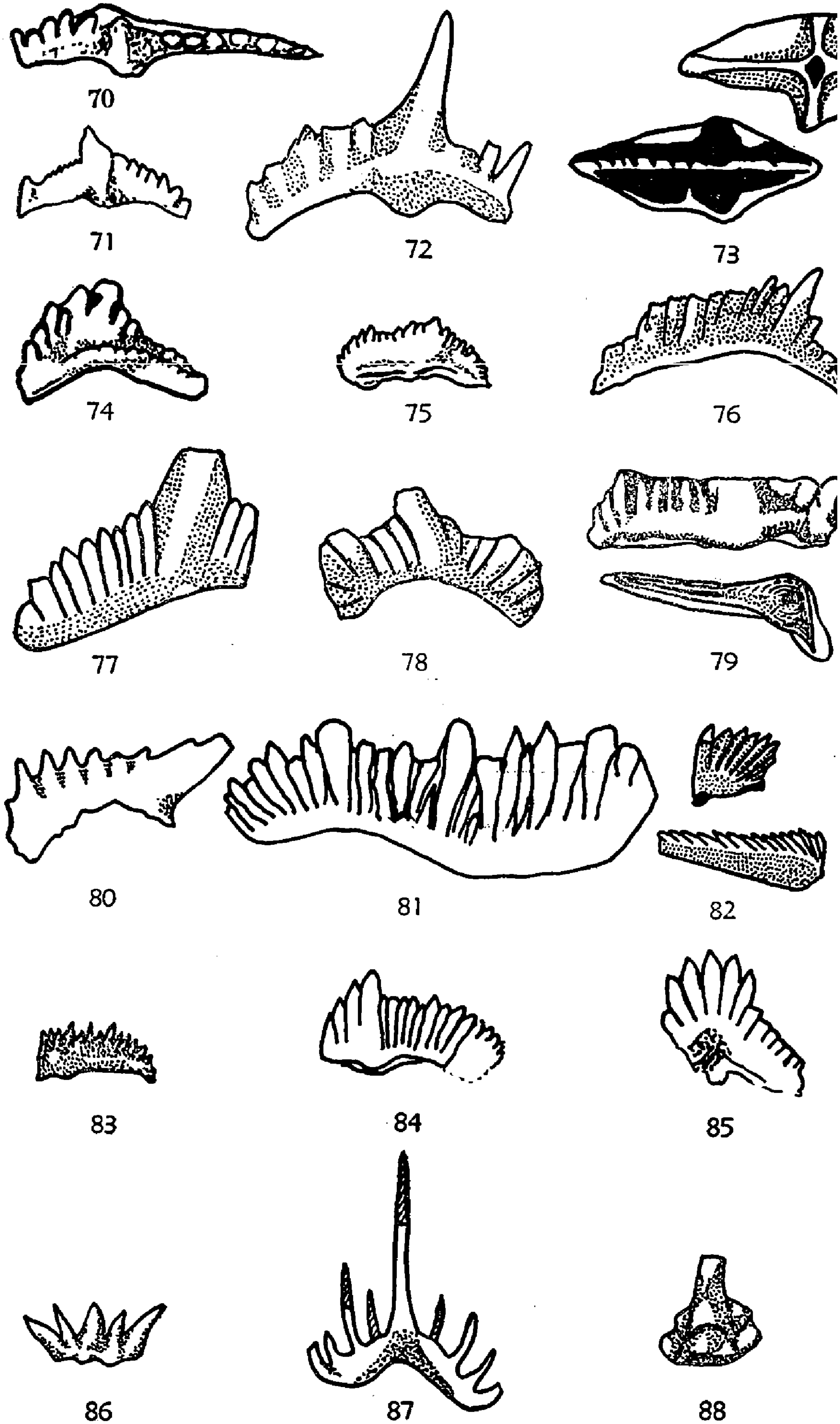
91. Escutcheon absent ...... *Ctenognathodus* (*Mehlina*) (Fig. 81, x45)
Escutcheon present 92

92. Escutcheon subcentral 93
Escutcheon on anterior end .... *Loxodus* (Fig. 82, x30)

93. Escutcheon small .... *Ctenognathodus* (*Ctenognathodus*)
(Fig. 83, x9)
Escutcheon broad .... *Ctenognathodus* (*Pandorinellina*)
(Fig. 84, x30)

94. Inner lateral process present .... *Prioniodus* (Fig. 58, x30)
Inner lateral process absent .... *Neoprioniodus* (Fig. 45, x30)

95. Blades and bars with inner and outer lateral
processes present together 96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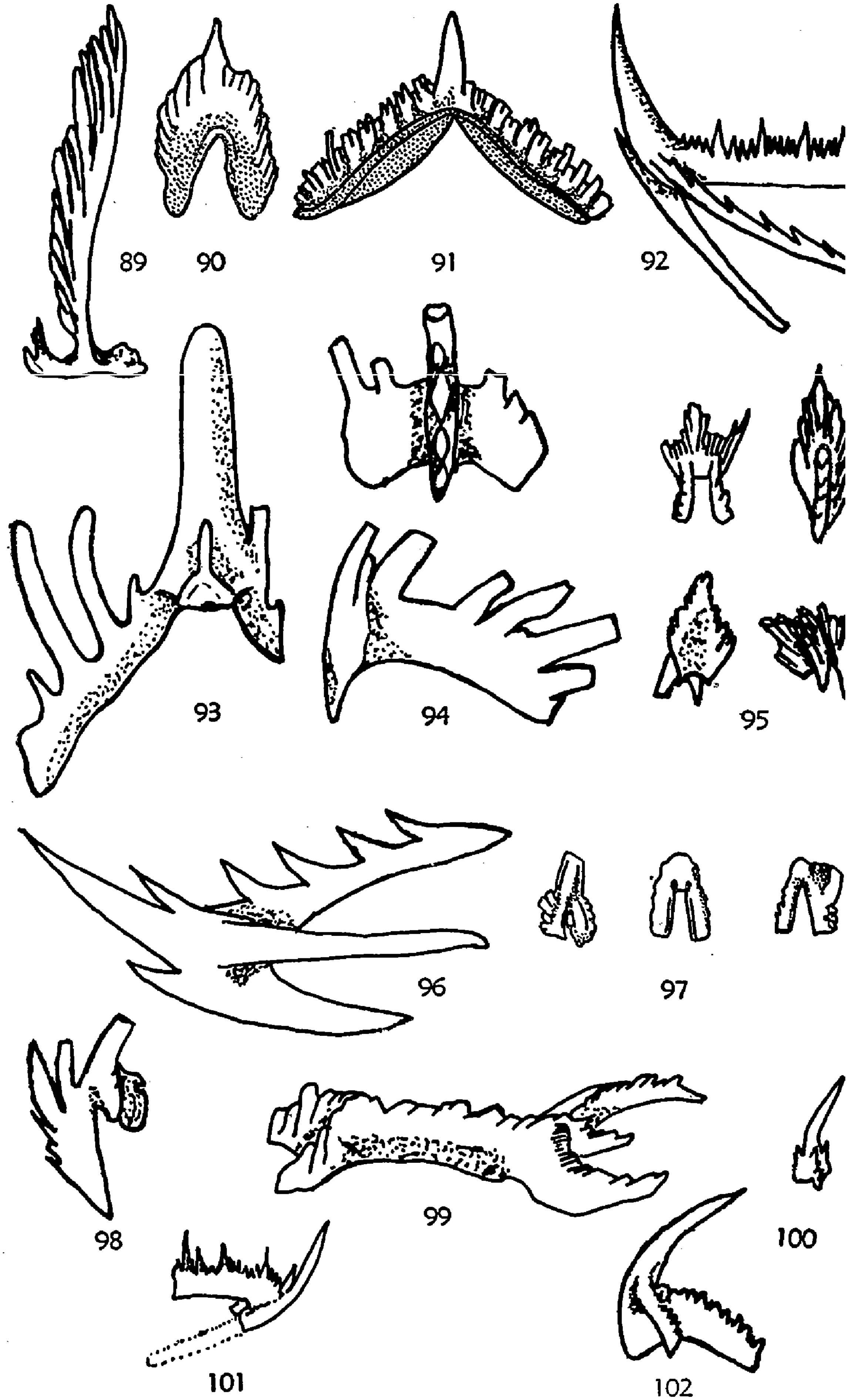
Platforms ---112
96. Only outer and inner lateral processes present ---------------- 97
Above present, with one more limb or bar present
(if more than 1 see 109) ---------------------------------- 99
97. Discrete denticles, escutcheon aboral ------------------------ 98
Fused denticles, escutcheon on
posterior side ----------------*Rhipidognathus* (Fig. 85, x30)
98. Denticles about same size,
unit straight --------------------*Stephanodella* (Fig. 86, x20)
Main denticle large, unit arched ---------*Hibbardella* (Fig. 87, x23)
99. Posterior process present, anterior process absent --------------100
Posterior process absent, anterior process present ---------------106
100. Posterior process denticulate -------------------------------------101
Posterior process not denticulate -------*Trichonodella* (Fig. 88, x34)
101. Posterior process bladelike ------------*Ptilognathus* (Fig. 89, x30)
Posterior process barlike, with discrete denticles ---------------102
102. Lateral processes bladelike -------------------------------------103
Lateral processes barlike ---------------------------------------104
103. One row of denticles in same plane ---------*Elsonella* (Fig. 90, x30)
Two or more rows of denticles,
not in same plane ----------------*Diplododella* (Fig. 91, x27)
104. Outer lateral process not denticulate ----*Keislognathus* (Fig. 92, x25)
Outer lateral process denticulate -------------------------------105
105. Escutcheon present ----------------------*Roundya* (Fig. 93, x30)
Escutcheon absent -----------------------*Ellisonia* (Fig. 94, x40)
106. Lateral processes fused into
one large blade ---------------------*Scutula* (Fig. 95, x40)
Lateral processes discrete, barlike -----------------------------107
107. Inner lateral process not denticulate ----*Holodontus* (Fig. 96, x100)
Inner lateral process denticulate ---------------------------------108
108. Anterior process short, not denticulate;
main cusp curved toward outer lat-
eral process ---------------------*Apatognathus* (Fig. 97, x27)
Anterior process long, denticulate; main
cusp curved posteriorly -----------*Tripodellus* (Fig. 98, x40)
109. Four processes present (anterior, posterior,
inner and outer lateral) ---------------------------------------110
Five processes present (same as above with
1 extra anterior process) ----------*Avignathus* (Fig. 99, x100)
110. Simple cone, with outer and inner lateral ex-
tensions of base denticulate; anterior and
posterior edges may or may not be den-
ticulate ------------------------*Trapezognathus* (Fig. 100, x30)
Elongate lateral processes and posterior bar ------------------111
111. Posterior bar denticulate, other
3 processes are not ---------------*Oepikodus* (Fig. 101, x30)
Anticusp may or may not be denticulate,
other 3 processes denticulate ----*Tetraprioniodus* (Fig. 102, x30)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112. Escutcheon wide, large, elongate almost
the length of the specimen ---------------------------- 113
Escutcheon small, elongate, or limited to a small rounded pit --- 127

113. Unit cross-shaped in top view --------*Staurognathus* (Fig. 103, x34)
Unit not cross-shaped in top view ---------------------------- 114

114. Large hornlike cusp on end of blade, almost as
big as blade -----------------*Pelekysgnathus* (Fig. 80, x34)
Units without above cusp ------------------------------------ 115

115. Long, moderately high, bladelike carina extends the
full length of the platform ------------------------------- 116
Long, very low carina may or may not extend
full length of platform, or carina may be absent ---------- 119

116. Carina completely on platform ------------------------------ 117
Carina extends anteriorly beyond platform proper ------------- 118

117. One denticulate outer lateral
process present -----------------*Ambolodus* (Fig. 104, x100)
Several denticulate inner and outer
lateral processes present ---- *Amorphognathus* (Fig. 105, x100)

118. One set of denticles on platform --------*Gnathodus* (Fig. 106, x48)
(Fig. 106a, x24)
Two sets of denticles on platform ----- *Balognathus* (Fig. 107, x100)

119. Units covered with blunt nodelike denticles on
on oral surface, occasionally connected
laterally to form coarse transverse ridges ----------------- 120
Units with medium to fine transverse
ridges on oral surface of platform ------------------------- 123

120. Nodes regular, aligned in rows ----------------------------- 121
Nodes irregular, in two rows, connected longi-
tudinally and laterally by low narrow
ridges; escutcheon widens evenly ------*Icriodina* (Fig. 108, x17)

121. Nodes in two to three aligned rows ------------------------- 122
Nodes in one row, anterior portion not in
line with posterior portion; posterior por-
tion consists of coarse ridges -------*Icriodella* (Fig. 109, x100)

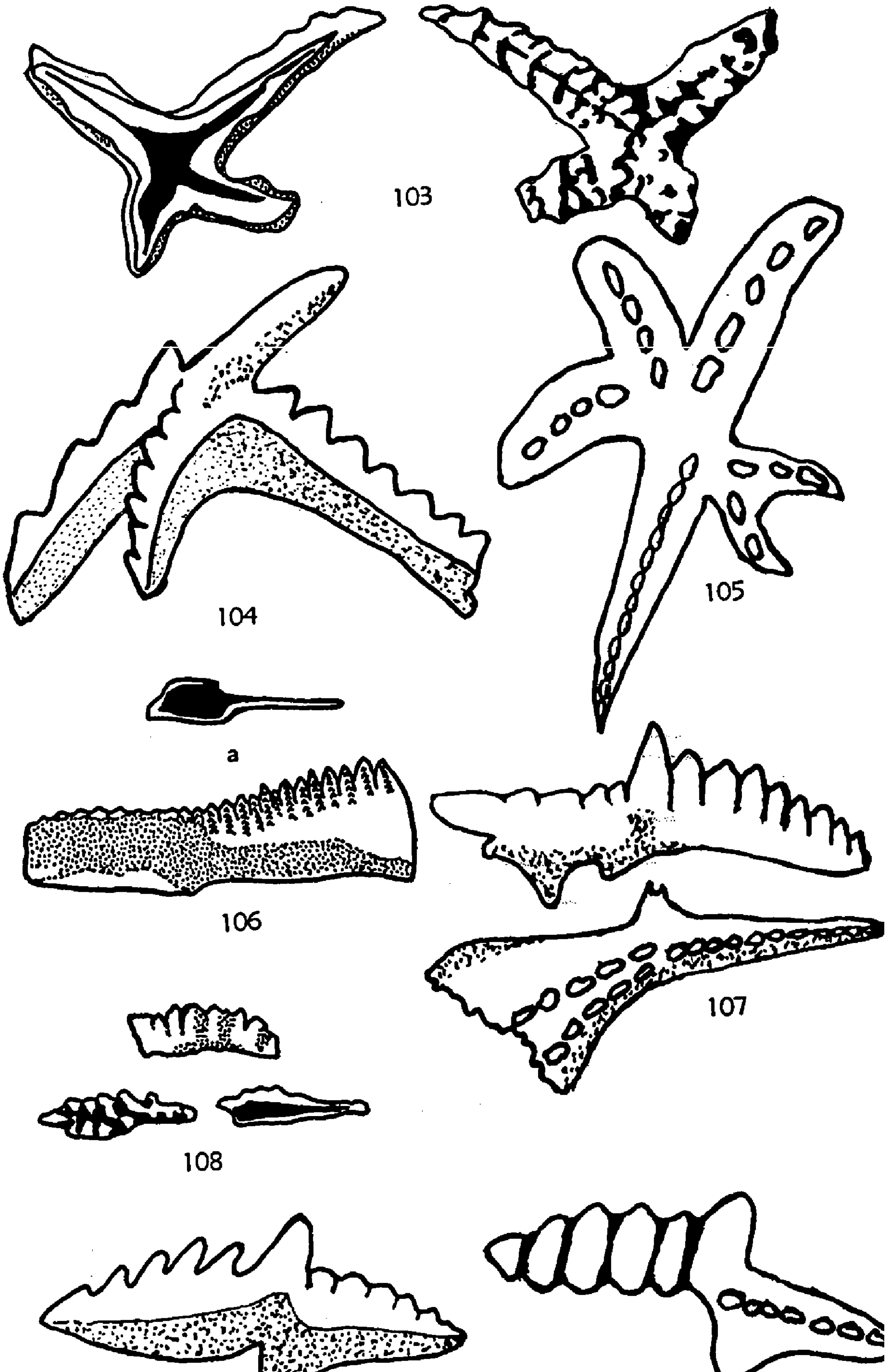
122. Unit widest at base, escutcheon
flares widely at one end ------------*Icriodus* (Fig. 110, x27)
Unit widest at top, escutcheon narrow. does
not flare as above ---------------*Scyphiodus* (Fig. 111, x40)

123. Units with no median carina, but a lateral one ---------------- 124
Units with median carina -------------------------------------- 125

124. Unit with a well-pronounced deep oral trough
separating two parapets ---------*Cavusgnathus* (Fig. 112, x34)
Unit with no deep trough
and no parapets --------------*Polygnathodella* (Fig. 113, x22)

125. Unit with no median sulcus ----------*Idiognathodus* (Fig. 114, x24)
Units with median sulcus -------------------------------------- 126

126. Escutcheon wide, mostly
beneath platform ----------- *Streptognathodus* (Fig. 115, x27)
Escutcheon long, almost extending full
length of specimen -----------*Taphrognathus* (Fig. 116, x30)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127. Units with a central escutcheon ---------------------------------128
Unit with elongate escutcheon,
terminally expanded --------------*Gondolella* (Fig. 117, x27)

128. Units with one keel on aboral surface ---------------------------129
Units with several keels on aboral surface ------------------------140

129. Carina does not project beyond platform ---------------------130
Carina projects beyond platform ----------------------------------132

130. Oral surface deeply concave, plates
equally developed --------------*Polygnathoides* (Fig. 73, x34)
Oral surface convex, inner plate more strongly developed ------131

131. Large denticles near middle of carina;
plates tuberculate --------------*Polygnathellus* (Fig. 76, x20)
Carina with subequal denticles; small nodes
occasionally on margin of inner plate --*Solenodella* (Fig. 75, x15)

132. Carina projects beyond anterior end of platform,
but not beyond posterior end ----------------------------133
Carina projects beyond anterior and
posterior ends of platform ----*Ctenopolygnathus* (Fig. 118, x40)
Platform broad, posterior extremity turned up or down --------135

135. Posterior end turned down ------------*Palmatolepis* (*Manticolepis*)
(Fig. 120, x40)
Posterior end turned up --------------*Palmatolepis* (*Palmatolepis*)
(Fig. 121, x10)

136. Large central denticle in middle of platform ---------- --- ---
(a) carina median ------------*Nothognathella* (Fig. 74, x27)
(b) carina on one side -----------*Mestognathus* (Fig. 122, x20)
Largest denticles near anterior end of carina ------------------ 137

137. Escutcheon limited to a small central pit ----------------------138
Escutcheon about 3 times as large
as above, flaring ----------*Pseudopolygnathus* (Fig. 123, x15)

138. Transverse ridges present on either side of central
carina that extends to posterior end of platform -----------139
Concentric ridges present that grade into tu-
bercules; carina does not extend to pos-
terior end of platform ----------*Polylophodonta* (Fig. 124, x8)

139. Posterior end straight ---------------*Polygnathus* (Fig. 125, x27)
Posterior end deflected downward
into a shallow trough ------------*Siphonodella* (Fig. 126, x15)

140. Units with 2-2½ keels or 4-5 half keels on aboral surface ------ 141
Units with 1½ keels or 3 half keels on aboral surface --------- 142

141. Unit with 4 half keels ----------------*Ancyrodella* (Fig. 127, x20)
Unit with 5 half keels ----------------*Ancyropenta* (Fig. 128, x20)

142. Unit anchor-shaped ----------------*Scaliognathus* (Fig. 129, x34)
Units not anchor-shaped --------------------------------------143

143. Carina sigmoid in top view --------------------------------------144
Carina not sigmoid in top view ----------------------------------146

144. Posterior end straight ---------------*Palmatolepis* (*Deflectolepis*)
(Fig. 119, x40)
Posterior end turned up or down ------------------------------145


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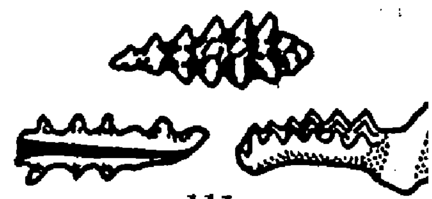
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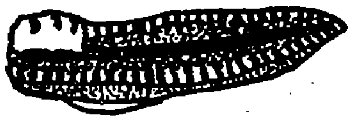
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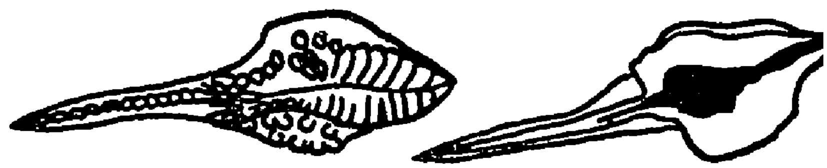
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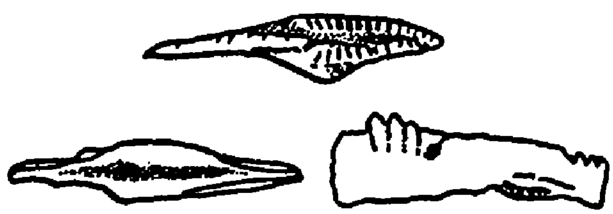
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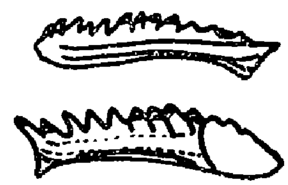
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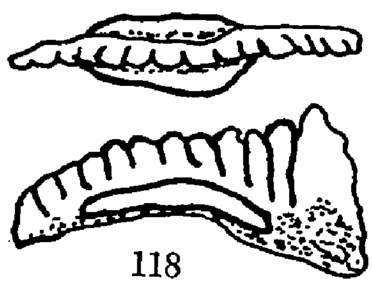
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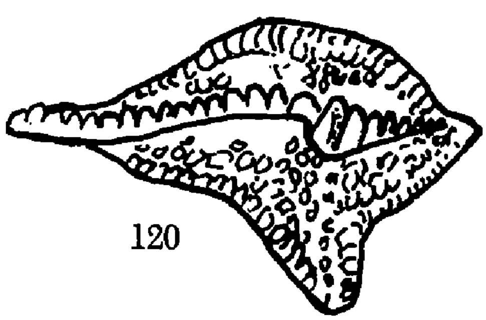
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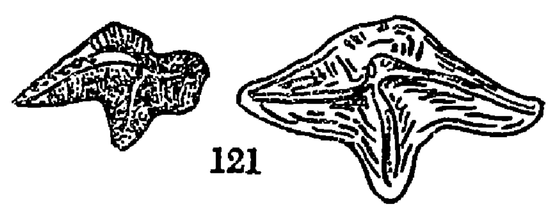
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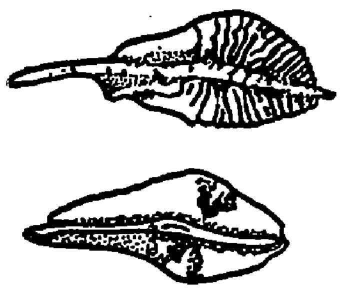
145. Posterior end turned down ---------- *Palmatolepis* (*Manticolepis*) (Fig. 120, x40)
Posterior end turned up ------------- *Palmatolepis* (*Palmatolepis*) (Fig. 121, x10)

146. Carina restricted to anterior half of platform ------------------ *Ancyroides* (Fig. 130, x27)
Carina extends to middle of platform and then bifurcates posteriorly into two carina -------------------- 147

147. Medium high carina projects anteriorly beyond platform; oral surface with irregular nodes --------------- *Ancyrognathus* (Fig. 131, x27)
Carina restricted to platform, low at posterior end; oral surface with regular transverse ridges or nodes -------- *Doliognathus* (Fig. 132, x33)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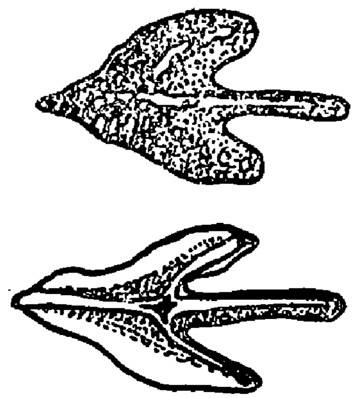
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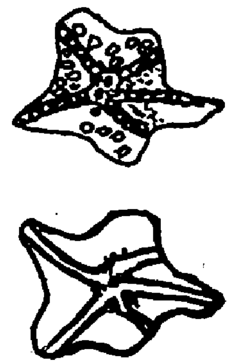
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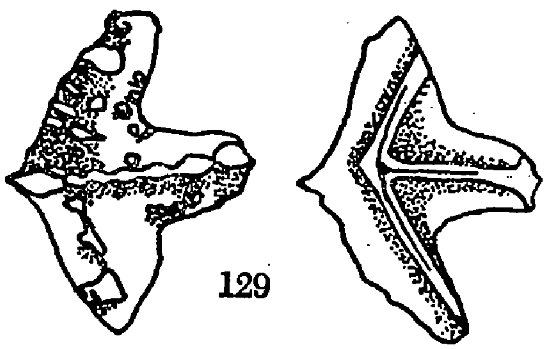
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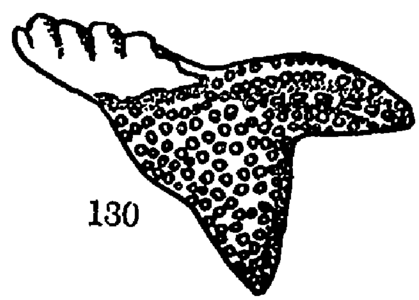
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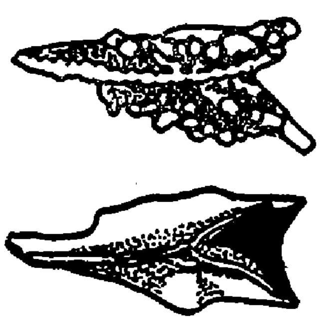
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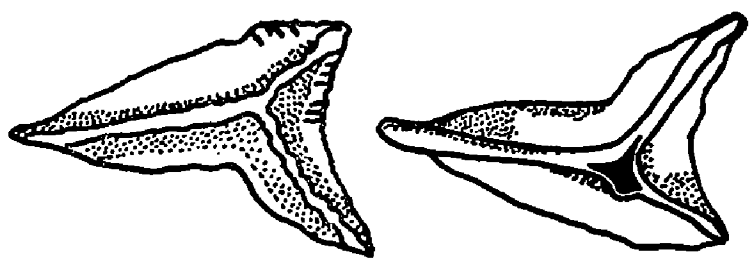
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Water-Flood Projects in Oklahoma

Louise Jordan

In 1957, Research Oil Reports published "Analysis of Available Data on Secondary Recovery in Oklahoma." This report lists the status of 364 water-flood projects by fields in the state, giving the name of the oil pay, average depth to pay, acreage being flooded, the number of active oil wells, average daily oil production, number of input wells, daily amount of water injection and water production.

Eighteen fields are listed as currently producing 2,474,500 barrels of oil per month by this secondary method of production. Burbank, Little Chief, Naval Reserve and Flat Rock in Osage County accounted for 1,123,000 barrels per month. In the northeast counties of the state (Nowata, Rogers, and Washington), the Delaware, Childers, Nowata, Alluwe, Canary, Weber and Dewey fields produced 622,500 barrels. In the Sholom Alechem field of Stephens County, 205,000 barrels were being produced from the Sims sand. The Olympic field in Okfuskee and Hughes Counties produced 130,000 barrels; Yale-Quay in Payne County, 127,000 barrels; Davenport in Lincoln County, 100,000 barrels; Jones in Oklahoma County, Mt. Vernon in Lincoln and Bald Hill in Okmulgee accounted for another 167,000 barrels. At the time, an estimated 3,600,000 barrels per month or nearly 121,000 barrels per day were being produced by means of water-flood in Oklahoma.

From the point of view of a geologist, it is interesting to know from which pay horizons water-injection projects are recovering oil. In the December 1957, Monthly Supplement of Research Oil Reports, 462 projects were listed alphabetically by operators. From this list, data including the number of acres under flood, number of active oil wells, and average daily oil production per project have been compiled according to the ages of the named productive pays.

Permian (Wolfcampian)

Name of Oil Pay	No. of acres	Oil Wells	Daily Prod. (bbls.)
Fortuna, Noble-Olson	790	23	322
Hoxsey, Hotson	240	7	23
Pennsylvanian (Virgilian)			
Soldiers Creek, Cache Creek, Zypsie, Walters	3,150	192	2,366
Crews, Sams	2,340	55	432
Hoover	772	6	73
Pennsylvanian (Missourian)			
Farris, Patty, Muncrief	1,000	28	481
Layton, Cleveland, Checkerboard, Burns	12.309	266	4,167
Loco, Healdton, Wade	1,360	378	1,645
Pennsylvanian (Desmoinesian)			
Wayside, Peru	5,316	257	1,463
Prue, Calvin	8,190	345	4,138
3rd Deese, Gibson	14,990	301	6,115
Senora, Allen	7,454	560	5,316

Skinner	8,594	206	2,538
Red Fork, Earlsboro	10,201	309	6,690
Burbank	47,170	1,803	37,780
Bartlesville	100,777	10,091	37,739
Booch	13,620	389	3,210
McAlester, Thurman	1,135	59	432
Boucher (?age)	160	3	32
Pennsylvanian (Atokan-Morrowan)			
Dutcher, Cromwell, Gilcrease, Timber Ridge	3,465	135	2,098
Springeran			
Sims	2,910	227	7,826
Mississippian			
"Chat"	4,015	89	972
Misener	661	21	1,350
Devonian-Silurian			
Hunton	1,750	39	813
Ordovician			
Viola	120	6	6
Wilcox, Simpson, McLish	4,980	121	1,993
TOTAL	257,469	15,916	130,050

Are Rare Minerals Rare?

A list of the rare elements might include lithium, berylium, boron, scandium, vanadium, gallium, germanium, indium, as well as a number of others less known such as samarium, europium, gadolinium and terbium. All of these elements are widely distributed, normally in minute concentrations, but very definitely not in the sense that they are "rare". Of course, lithium and boron are found in considerable concentration in a few localities but they, together with the others named, are found in many of the rocks of the earth's crust although the amount present may be quite small.

Nathan C. Rockwell in the February issue of Rock Products states that samarium occurs in most igneous rocks and in certain shales, the average in igneous rock being about 6½ grams per ton. Europium is found in igneous rock in about 1 gram per ton and also in some shales. Gadolinium occurs in igneous rock in about the same amount as samarium, whereas terbium in igneous rock amounts to less than 1 gram per ton, but it is there.

It is difficult to accept the usual definition of the word rare, that is, infrequent or exceptional, to characterize elements that are so widely distributed. Little is known about them, it is true, but little by little uses for each and every element occurring in the earth's crust are being discovered in modern chemistry and metallurgy. Published chemical analyses are not sufficiently complete and therefore are of no help in looking for these "rare" elements. Looks as if there is a big job ahead for geologists, geochemists, and chemical analysts.

A. L. B.

Recently Published Illustrations of the Haragan Brachiopod, "Delthyris Perlamellosa"

THOMAS W. AMSDEN

In a recent issue of the Senckenbergiana Lethaea (1957, vol. 38, p. 311-334, pls. 1-3) Dr. A. J. Boucot illustrates several specimens of a Haragan brachiopod which he identifies as *Kozlowskiella* (*Megakozlowskiella*) sp. This brachiopod, which is common in the Haragan, has generally been considered to be conspecific with *Spirifer perlamellosus* Hall from the New Scotland of New York, a species which has for many years been referred to Dalman's genus *Delthyris*. In the above mentioned paper Boucot erects a new genus, *Kozlowskiella*, and two new subgenera, *K.* (*Koslowskiella*) and *K.* (*Megakozlowskiella*), for those Spiriferidae possessing frilly lamellae. The type of *Kozlowskiella* (*Kozlowskiella*) is *K.* (*K.*) *strawi* Boucot from the Wenlock of Great Britain, and the type of *Kolowskiella* (*Megakozlowskiella*) is *Spirifer perlamellosus* Hall from the Helderberg of New York. The Haragan representatives of *Kozlowskiella* (*Megakozlowskiella*) differ from the New York shells in several respects and in a forthcoming paper the writer is removing them to a new species.

According to Boucot *Kolowskiella* ranges from the Middle Silurian to the Lower Devonian, although in the Hunton group it is restricted to a single species from the Haragan-Bois d'Arc strata. This author restricts Dalman's genus *Delthyris* to those Spiriferidae with non-frilly lamellae and gives the North American range as Middle to Upper Silurian (in Europe the genus is present in the Lower Devonian). This genus is represented in the Hunton group by the Henryhouse species, *Delthyris kozlowskii* Amsden.

Some Oklahoma Underclays

Underclays are the relatively structureless light-colored clays at the base of coal beds. They are thought to be the soils upon which grew the vegetation which made the coal. A study of such clays in the central United States has been published by Schultz in a recent paper. Four hundred samples from 10 stratigraphic zones were collected and the clays were analyzed, mainly by the x-ray diffraction method. The clays were found to be mainly illite, with lesser amounts of mixed-layer illite-montmorillonite, quartz, and a vermiculite to chlorite complex. Basinal clays and earlier Pennsylvanian clays contain a greater proportion of kaolin. Schultz concludes that the clays are not residual soils.

The correlation table (Table I, p. 365) contains many errors. The Hartshorne and Riverton coals are placed in the Morrow, Lampasas is spelled Lampass and Marmaton is rendered as Marathon. The Cherokee is shown above the Lampasas and "Boggy redbed" is placed with the Tebo and Weir-Pittsburg coals.

The Oklahoma specimens are as follows:

Zone 2 (Upper Morrow). 34. Underclay of Lower Hartshorne coal in road cut just south of Adamson, Pittsburg Co. This zone is in the Hartshorne formation, Krebs group. The locality is east line sec. 7, T. 5 N., R. 17 E. (see Hendricks, U. S. Geol. Survey, Bull. 874-A, p. 12, 1937).

35. Underclay of Upper Hartshorne coal. "1-2 miles northwest of Wilburton". This coal is also in the Krebs group.

36. Underclay from Evans Coal Co. strip mine, "SE 1/4 sec. 1, 1-2 miles north of Bokoshep." This locality is probably the underclay of the Lower Hartshorne coal in sec. 17, T. 9 N., R. 24 E., 4 miles north of Bokoshe, LeFlore Co.

Zone 3 (Middle part of Krebs group). 19. Old strip mine just north of U. S. Highway 270, about 0.8 miles east of Alderson. This is underclay of the McAlester coal in NE1/4 sec. 21, T. 5 N., R. 16 E., Pittsburg Co.

20. From slope mine of Lone Star Steel Co., 4 miles east of Krebs. This is underclay of the McAlester coal.

Zone 4 (Upper part of Boggy formation). 35. Underclay of Secor coal by old mine, possibly in SE1/4 sec. 21, T. 6 N., R. 16 E.

36. NW1/4 sec. 28, T. 6 N., R. 16 E. about 80 feet below Secor coal. This coal and underclay would lie low in the Boggy formation.

Zone 5. Maroon shale in Boggy formation on U. S. Highway 270 5 miles west of McAlester and 1/2 mile east of Coal Creek bridge. The exposure is at the base of the fourth Boggy sandstone of the area and is near the level of the Boggy coal bed exposed north of Heywood. The locality is in NW1/4 sec. 31, T. 6 N., R. 14 E., Pittsburg Co.

Zone 6 (Cabaniss group). 38. Underclay of Croweburg coal in strip pit 3 miles west of Sequoyah, Rogers Co.

39. Underclay of Croweburg coal in strip pit in SE1/4 sec. 33, T. 20 N., R. 15 E., Rogers Co.

40. Underclay of Henryetta coal in McInnis and Grafe Coal Co. strip pit, probably in NE1/4 sec. 17, T. 11 N., R. 13 E.

41. Shale in road cut on U. S. Highway 270, apparently in the Senora formation from a shale tongue in the sandstone member, possibly sec. 15, T. 5 N., R. 11 E., Hughes Co.

42. Shale from upper member of Senora formation below Calvin sandstone, west center sec. 22, T. 6 N., R. 10 E., Hughes Co.

Zone 7 (Fort Scott formation). 13. On U. S. Highway 60, SE1/4 sec. 35, T. 26 N. (given as 36 N.), R. 18 E., about 4 miles west of Estella (given as Estelle). This would be the underclay of the Iron Post coal at a locality 2 1/2 miles west of Estella, Craig Co.

14. Underclay of Croweburg coal if locality is correctly given, 0.1 mile west of SE cor. sec. 36, T. 23 N., R. 16 E., Rogers Co.

15. Underclay of Iron Post coal, near south 1/4 cor. sec. 11, T. 21 N., R. 15 E., Rogers Co.

Zone 8 (Upper part of Marmaton group). 24. Underclay of Lexington coal in SW cor. sec. 27, T. 29 N., R. 18 E., Craig Co.

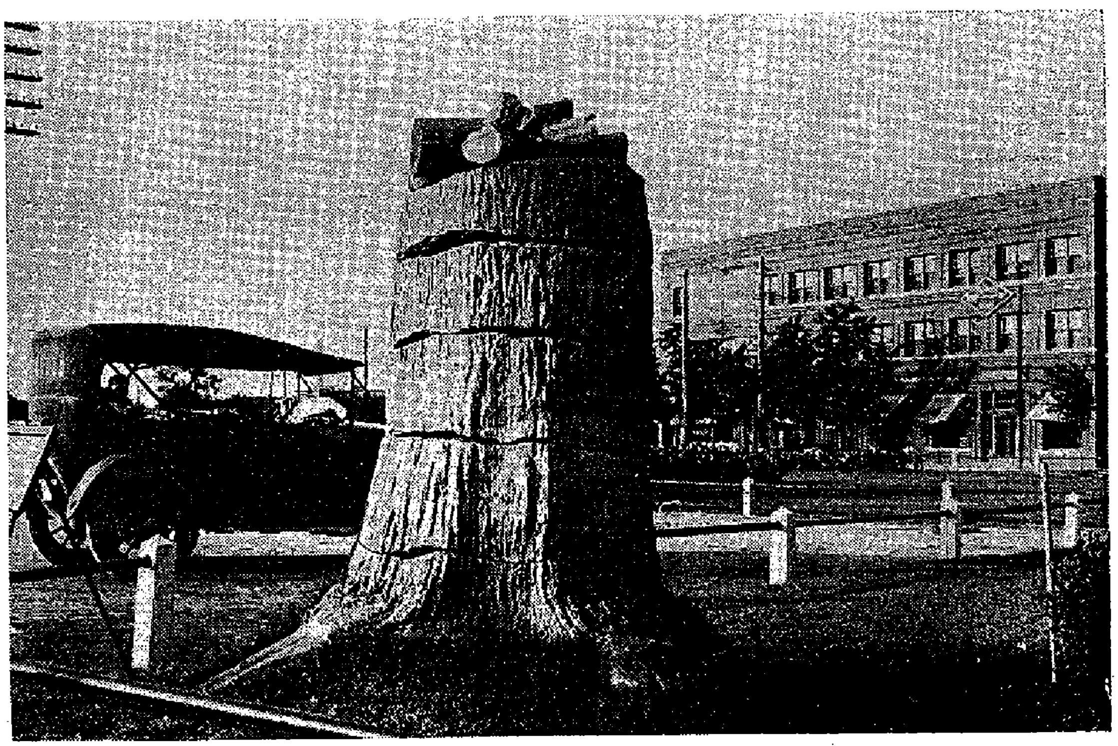
Zone 10 (Virgilian). 14. Shale in road cut on Okla. Hy. 99 1/2 mile south of Seminole City limits. This is a red shale in the Ada formation.

The conclusions and the pattern of distribution of clay types are largely invalidated by inaccurate data which could have been checked by consultation with geologists familiar with local stratigraphy.

Schultz, Leonard G., "Petrology of underclays." Geol. Soc. America, Bull., vol. 69, p. 363-402, April, 1958. C. C. B.

Ancient Fossil Stump at El Reno

In the grounds of the Rock Island railroad station at El Reno, about 100 feet east of the building, is a specimen which makes the geologist take a longer look. He is sure the specimen did not come from the rocks around El Reno. The sign on the specimen clarifies the matter. It reads, "Petrified tree. This tree was found March 14, 1914 at a depth of 40 feet, while sinking shaft No. 9 of Rock Island Coal Mining Company, at Alderson, Oklahoma." This shaft was in SE¼ sec. 24, T. 5 N., R. 15 E., one mile southeast of Alderson, Pittsburg County. The stump came from the basal part of the Savanna formation or the upper part of the McAlester formation. It is what is termed a sand-cast. As the stump decayed the cavity was filled with fine sand washed into the opening. The sand grains were slowly cemented and the cast remained as a resistant mass in the accumulated clay and mud, which became shale.



When the stump was emplaced at El Reno it was about 8 feet high and several specimens of parts of the underground stems of tree ferns were in position on top. The loose specimens have all been carried away and only about half of the stump remains. The photograph was taken in 1939.

The plant was a *Calamites* of tree size. They were common during the Pennsylvanian period (200 to 250 million years ago).

C. C. B.

A Note on Russian Paleontology

American geologists have great trouble with the flood of Soviet paleontological literature, since 1948 printed only in Russian. Evidence that Russians have difficulties with English language papers is clear in a recent article by Mandelstam (M. J. Mandelstam, Materialy po Paleontologii, new series, no. 12, p. 138-139, 1956). He cites the genus *Theriosynecum* Teichert 1939 and emends the genus. *Cypris purbekensis* Forbes is given as type species. *Jonesina* of Roth 1933, is placed in synonomy and *Morrisonia* Moore, Lalicker, and Fischer is given as a synonym.

This reviewer can see Mandelstam's errors (although he can not read the text) because the genus was actually described by the reviewer. The correct citation is:

Morrisonia Branson 1935, Jour. Paleontology, vol. 9, p. 521. Genotype *Morrisonia wyomingensis* Branson 1935. Not *Morrisonia* Grate 1874.

Theriosynoecum Branson 1936, Jour. Paleontology, vol. 10, p. 323, new name.

I do not consider that the specimens referred to *Jonesina* by Roth in 1933 belong to the genus *Theriosynoecum.* Mandelstam errs in these particulars:

He misspells the generic name as *Theriosynecum.*

He attributes the genus to Teichert 1939 (in this article Teichert gave the new generic name *Rayella* to an Ordovician genus originally given the preoccupied name *Basslerites*).

He incorrectly cites *Cypris purbeckensis* as genotype and misspells the trivial name (purbekensis).

He refers *Metacypris persulcata* Peck from the Bear River of Wyoming to *Theriosynoecum.* Peck had the types of *Theriosynoecum* and the species is certainly not a *Theriosynoecum.*

He describes a new species, *T. difensorum* (p. 139, pl. 26, fig. 5) from the Cretaceous of the Transbaikal. The species clearly does not belong to the genus; probably is a *Metacypris.*

He figures (text fig. 51) a form as *T. kristaphovitshi* Mandelstam as gen. et sp. nov. Obviously this is not a new genus and probably the specific name was a manuscript name that leaked through into print.

Mandelstam's article is but one of many in the book in which 135 new genera of fossils, animals and plants are described. If the other genera are as badly handled as the one familiar to the reviewer, the fact that the entire text is in Russian will be the least of the difficulties of paleontologists who try to use the book.

The book is Vsesouizn'ia Nauchno-Issledovatel'skii Geologicheskii Institut (vsegem), Ministerstva Geologii i Ochranii nelr SSSR, Novaya Seria, Vesnick 12, Paleontologia, Materialy po Paleontologii, novye semeistva i rodyi, Moscow, 1956, 354 pages, 43 plates.

C. C. B.

Rock Salt as Cement in Sediments

Occasionally a short paper is of unusual significance. W. A. Waldschmidt has published a five-page paper (two of which are illustrations) in which he shows that halite constitutes 0.24 to 29.0 pounds per cubic foot in the rocks examined. Halitic sandstones are common in the Permian

Seven Rivers and Yates sandstones. The mineral is identified in crushed samples immersed in index liquids or in thin sections ground in oil. Perhaps the occurrence of halite as a cementing material explains the fairly common sandstones which resemble on surface the blighted soils adjacent to brine wells.

Waldschmidt, W. A., "Halite as a cementing material in sandstones." Amer. Assoc. Petroleum Geologists, Bull., vol. 42, p. 871-875, April, 1958.

C. C. B.

Permian Snails, and Some Oklahoma Forms

The excellent fossils extracted by acid from Permian rocks of Texas and New Mexico have enabled paleontologists to reevaluate genera and species of many groups. The latest sections to be published are those on the gastropods. Part 1, by Ellis L. Yochelson, was printed in 1956, and covers 6 superfamilies. Part 2, by Roger L. Batten, has just been issued, and is concerned with the Pleurotomariacea. Our understanding of the Permian snails is distinctly improved. The plates are excellent and the descriptions are detailed.

Yochelson erected 6 new genera and 30 new species; Batten 2 new genera and 28 new species. In addition, Yochelson had erected a new genus and species in 1956 and Batten 5 new genera and 5 new species in 1956.

Some comments need to be made on some of the work. Batten extends the range of *Phymatopleura brazoensis* (Shumard) into the Wolfcampian (p. 205) and gives the locality of the single specimen as U.S.N.M. 712. This collection was made by the reviewer and was etched by Knight from blocks of limestone in the cap of the small isolated hill south of the railroad station at Orogrande, Otero County, New Mexico. The specimen figured as Plate 36, figure 16 is from U.S.N.M. 702t, from shales believed to be Wolfcamp near Gaptank, Glass Mountain area, Texas. Locality 712 yielded *Glyptotomaria marginata* Batten, 1958, *Tapinotomaria globosa* Batten, 1958, *Omphalotrochus cochisensis* Yochelson, 1956, *Anomphalus varescens* Yochelson, 1956, and *Dichostasia simplex* Yochelson, 1956. The latter two are figured by Yochelson and clearly have a different preservation than the specimen of *Phymatopleura*. Batten also gives *Paragoniozona* of *P. nodilirata* Nelson from Locality 712 (p. 206), but his figure (pl. 36, fig. 17) is of a specimen from 702t. There is evidently a typographical error in both cases. U.S.N.M. locality 712b is the same bed and locality and the etch blocks were collected by this reviewer at a later time than 712. This lot contains *Discotomaria nodosa* Batten, 1958 (figured paratype, pl. 37, figs. 19-20), *Glyptotomaria marginata* Batten, 1958, *Euomphalus cornudanus* (Shumard), 1859, *Omphalotrochus obtusispira* (Shumard), 1859, *Anomphalus varescens* Yochelson, 1956, *Dichostasia simplex* Yochelson, 1956, and a platycerid.

Other species listed or described are from U.S.N.M. localities 712 h, 712 i. This locality (it is but one) deserves further mention. The material was collected by this reviewer and Jack S. Baker in 1946. The snails were sent to Knight, the cephalopods to A. K. Miller, the brachiopods to J. S. Williams and G. A. Cooper, and the clams to N. D. Newell. The locality has been inaccessible for some time as it lies in an army ordnance range. The beds crop out in a small wash on and near the crest of a low divide on an isolated hill developed on a fault block. The small collecting area is just north of the center of the south line of the southwest quarter of sec. 20, T. 22 S., R. 10 E. above nearly barren dolomites, and flooring the dry wash is a limestone containing abundant specimens of *Antiquatonia.* This bed is overlain by five feet of barren shale above which lies the molluscan bed, three feet of light brown calcarous silty shale, which at most places is weathered to clay with calcareous nodules. The fauna consists of *Pseudoschwagerina* sp. (one specimen), *Amphiscapha* (*Amphiscapha*) *proxima* Yochelson, 1956 *Aviculopinna* sp., *Medlicottia* sp., *Thalassoceras milleri* (Boese), 1919, *Bransonoceras bakeri* Miller and Parizek, 1948, *Properrinites* sp., *Derbyia* sp., and several unidentified species. The fossil bed lies about 600 feet above the base of the Hueco limestone, below which is the Powwow conglomerate member.

A few Oklahoma specimens enter into the two papers. Yochelson identified *Omphalotrochus wolfcampensis* Yochelson, 1956, in the Red Eagle limestone in the southern and abandoned part of the rock quarry near Burbank, Osage County.

Batten refers to specimens of *Phymatopleura brazoensis* (Shumard) from the Wewoka (p. 205), to an undescribed species of *Borestus* from the Wann shale (p. 206), to a species of *Glyptotomaria* (*Glyptotomaria*) from Pennsylvanian shales of Oklahoma (p. 214), and he figures a specimen of *Phymatopleura* sp. from the Wann shale near Copan, Washington County (p. 36, fig. 18).

References

Yochelson, E. L., 1956. Labridens, a new Permian gastropod. Washington Acad. Sci., Jour., vol. 46, p. 45-46.

Batten, R. L., 1956. Some new pleurotomarian gastropods from the Permian of west Texas. Idem, p. 42-44.

Yochelson, E. L., 1956. Permian Gastropoda of the southwestern United States. 1. Euomphalacea, Trochonematacea, Pseudophoracea, Anomphalacea, Craspedostomatacea, and Platyceratacea. Amer. Museum Nat. History, Bull., vol. 110, article 3, p. 173-276, plates 9-24.

Batten, R. L., 1958. Permian Gastropoda of the southwestern United States. 2. Pleurotomariacea, Portlockiellidae, Phymatopleuridae, and Eotomariidae. Idem, vol. 114. article 2, p. 153-246, plates 32-42.

C. C. B.

Two Unusual Oklahoma Crinoids Described By Harrell Strimple

The November issue of the Journal of the Washington Academy of Sciences (vol. 47, p. 369, 1957) has an interesting description of two aberrant crinoids by Mr. Harrell L. Strimple. One of these, *Laudonocrinus* sp., came from the Avant limestone (Pennsylvanian) of Osage County, and is unusual in having the posterior interradius occupied by six elements instead of the normal three. The second specimen, *Phanocrinus alexanderi* Strimple, came from the Fayetteville formation (Mississippian) near Afton, Oklahoma, and also bears extra plates in the posterior interradius. The author notes that this plate structure is unusual in late Paleozoic crinoids.

TWA