

ANNOTATED BIBLIOGRAPHY OF PENNSYLVANIAN AND PERMIAN
TRILOBITES FROM KANSAS AND ADJACENT AREAS
OF MISSOURI, NEBRASKA, AND OKLAHOMA

LOREN E. BABCOCK

Kansas Geological Survey
1930 Constant Avenue
The University of Kansas
Lawrence, Kansas 66047

17 August 1990

Kansas Geological Survey
Open-file Report

Disclaimer

The Kansas Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations based on data used in the production of this document or decisions based thereon. This report is intended to make results of research available at the earliest possible date, but is not intended to constitute final or formal publication.

INTRODUCTION

Trilobites are a persistent component of Carboniferous (Mississippian and Pennsylvanian) and Permian biotas of the North American Midcontinent. Numerically, faunas rarely contain more than 1 percent trilobites, although locally they can contain up to about 20 percent trilobite sclerites (counting only cranidia, librigenae, and pygidia). Trilobites are present in most marine facies of Pennsylvanian and Permian rocks in Kansas and neighboring states, but tend to be most abundant in limestones, especially coated grain (so-called oolite) intervals, and calcareous shales. The diversity of trilobite taxa in any one fauna is low, rarely exceeding two species. Trilobites are almost always absent from black shales, and rarely present in dark gray shales.

The purpose of this annotated bibliography is to provide a source of information about the Pennsylvanian and Permian trilobites of Kansas. Some citations also cover neighboring areas of Missouri, Nebraska, and Oklahoma. Most taxa reported from those areas are the same as those reported from Kansas. This bibliography includes only published sources, except for Gheyselinck (1937), in which the manuscript species Phillipsia (Neophillipsia) decurtata was described. No attempt has been made to identify the other numerous references in unpublished theses and dissertations. The bibliography is fairly complete

for illustrated or described specimens, particularly those of Kansas. Some material reported in faunal lists or passing references in texts, however, has not been included.

Taxonomic nomenclature in this text is exactly that published in the cited papers. Species reported from Kansas, Missouri, Nebraska, or Oklahoma, in all their published combinations, are:

- 1) Phillipsia cliftonensis Shumard in Shumard and Swallow, 1858;
Ditomopyge cliftonensis (Shumard in Shumard and Swallow, 1858)
- 2) Phillipsia (Neophillipsia) decurtata Gheyselinck in Weller 1944; Ditomopyge decurtata (Gheyselinck in Weller, 1944)
- 3) Cheiropyge kansasensis Weller, 1944
- 4) Ditomopyge lansingensis Newell, 1931
- 5) Proetus longicaudus Hall, 1861
- 6) Phillipsia major Shumard in Shumard and Swallow, 1858
- 7) Phillipsia missouriensis Shumard in Shumard and Swallow, 1858;
Ameura missouriensis (Shumard in Shumard and Swallow, 1858)
- 8) Griffithides morrowensis Mather, 1915; Paladin (Paladin) morrowensis Mather, 1915; Paladin morrowensis (Mather, 1915)
- 9) Phillipsia nodocostata Hare, 1891
- 10) Griffithides olsoni Williams, 1933; Ditomopyge olsoni (Williams, 1933)
- 11) Griffithides parvulus Girty, 1911; Ditomopyge parvulus (Girty, 1911); Ditomopyge parvula (Girty, 1911)
- 12) Phillipsia sangamonensis Meek and Worthen, 1865; Ameura

sangamonensis (Meek and Worthen, 1865)

13) Phillipsia scitula Meek and Worthen, 1865; Phillipsia
(Griffithides) scitula Meek and Worthen, 1865; Griffithides
scitulus (Meek and Worthen, 1865); Cyphinium scitula (Meek
and Worthen, 1865); Ditomopyge scitula (Meek and Worthen,
1865)

14) Anisopyge whitei Pabian and Fagerstrom, 1972

Because it has been impossible to ascertain the correct identity
of reported but unillustrated specimens, it is not possible to
authoritatively synonymize all cited materials. For synonymies
of most trilobite taxa from the late Paleozoic of Kansas and
adjacent areas, see Pabian and Fagerstrom (1972).

ANNOTATED BIBLIOGRAPHY

Babcock, L. E., and D. F. Merriam. 1990. Cladistic analysis of selected late Paleozoic trilobites of North America. Kansas Academy of Science, Abstracts, 9:5.

Results of a phylogenetic (numerical cladistic) analysis on some late Paleozoic trilobites are reported. The study includes three species that are found in Pennsylvanian rocks of Kansas, Missouri, Nebraska, or Oklahoma (Ameura missouriensis, Ditomopyge decurtata, and D. scitula).

Ball, S. M., M. M. Ball, and D. J. Laughlin. 1963. Geology of Franklin County, Kansas. Kansas Geological Survey, Bulletin 163, 57 p.

Trilobite pygidia are listed as occurring in the South Bend Limestone Member and the Stoner Limestone Member of the Stanton Limestone (Pennsylvanian) at section B1, an abandoned quarry at the center of the east line of sec. 23, T. 18 S., R. 19 E., Franklin County, Kansas (p. 46).

Bass, N. W. 1929. The geology of Cowley County, Kansas, with special reference to the occurrence of oil and gas. Kansas Geological Survey, Bulletin 12, 203 p.

Griffithides sp. is recorded from the uppermost few feet of the Eskridge Shale (Pennsylvanian) at U.S.G.S. locality 6162, near the center of sec. 11, T. 34 S., R. 7 E., Cowley County (p. 58). The identification was made by G. H. Girty.

Bennett, D. K. 1984. Fossils, p. 96-162. In R. C. Buchanan (ed.), Kansas Geology. An introduction to Landscapes, Rocks, Minerals, and Fossils. University of Kansas Press, Lawrence.

Trilobites such as Phillipsia (fig. 53) are listed as being found in the Pennsylvanian of Kansas.

Bennett, J. 1896. A preliminary catalogue of the invertebrate paleontology of the Carboniferous of Kansas. Kansas Geological Survey, Bulletin (The University Geological Survey of Kansas), 1:270-310.

Phillipsia cliftonensis, P. major, and P. scitula are listed from Pennsylvanian rocks in various counties of Kansas.

Boardman, D. R. II, R. H. Mapes, T. E. Yancey, and J. M. Malinky. 1984. A new model for the depth-related allogenic community succession within North American Pennsylvanian cyclothem and implications on the black shale problem, p. 141-182. In

N. J. Hyne (ed.), Limestones of the Mid-Continent. Tulsa Geological Society, Tulsa.

The distribution of trilobite remains in Pennsylvanian cyclothems of the Midcontinent is related to proposed depth-related communities in which they occur. Trilobites (Ditomopyge is the only genus listed) are indicated as present in deep-water, moderate-depth, and shallow-water communities: the Sinuitina-juvenile ammonoid-Anthraconeilo subcommunity, the Trepostira-mature ammonoid-Anthraconeilo subcommunity, the moderate-depth stenohaline communities (brachiopod, crinoid, sponge, fusulinid, coral), and the shallow-water molluscan communities (fig. 9, tables 2, 3, p. 176).

Boos, M. F. 1929. Stratigraphy and fauna of the Luta Limestone (Permian) of Oklahoma and Kansas. Journal of Paleontology, 3:241-253.

Phillipsia major is cited as rare in the Luta Formation (Permian) of Kansas and Oklahoma (p. 247).

Branson, C. C. 1961. Trilobite from the Francis Shale near Ada. Oklahoma Geology Notes, 21:179-180.

A specimen of Ameura sangamonensis from the Francis Shale

(Pennsylvanian) in the shale pit at the brick plant south of Ada, Oklahoma is illustrated. The dorsal surface of much of the cephalon is encrusted by small tubes referred to the serpulid worm Cornulites. For a revised interpretation of the epibiont, see Branson (1964).

Branson states that "it appears probable that A. sangamonensis, A. major, A. missouriensis (Shumard), Proetus longicaudus Hall, and Phillipsia nodocostata Hare all belong to a single species."

Branson, C. C. 1964. Sessile Foraminifera in the Pennsylvanian of Oklahoma. Oklahoma Geology Notes, 24:188-189.

The specimen of Ameura sangamonensis previously illustrated as Figure 2 of Branson (1961) is reillustrated. Minute tubes previously referred to as Cornulites are suggested to represent a foraminifer, Minammodytes(?).

Branson, C. C. 1965. Trilobite from the Lenapah Limestone. Oklahoma Geology Notes, 25:27-28.

Ditomopyge parvulus is reported and illustrated from the Lenapah Limestone (Pennsylvanian) of Oklahoma.

Brezinski, D. K., and J. H. Stitt. 1982. Ditomopyge scitula (Meek and Worthen) from the Lower Pennsylvanian of central

Missouri and central Texas. *Journal of Paleontology*,
56:1242-1250.

The previously lost "cotypes" (=syntypes) of Griffithides olsoni from the Cherokee Group (Pennsylvanian) of central Missouri are reillustrated and described. Also reported are studies on a large sample of additional material from "strip pits in the Desmoinesian 8 miles north of Columbia, Missouri," and from Texas. G. olsoni is placed in synonymy with Ditomopyge scitula.

Brezinski, D. K. 1986. An opportunistic Upper Ordovician trilobite assemblage from Missouri. *Lethaia*, 19:315-325.

Clusters of numerous Ditomopyge scitula present in a thin argillaceous Pennsylvanian limestone in Missouri are attributed to an opportunistic life habit (p. 323, fig. 7C, Table 2).

Buchanan, R. C., and J. R. McCauley. 1987. *Roadside Kansas. A Traveler's Guide to its Geology and Landscapes*. University of Kansas Press, Lawrence, 365 p.

Trilobites are listed as being "sometimes found in Pennsylvanian rocks in eastern Kansas" (p. 348).

Chamberlain, C. K. 1969. Carboniferous trilobites: Utah species and evolution in North America. *Journal of Paleontology*, 43: 41-68.

The stratigraphic ranges and presumed evolutionary patterns of North American Carboniferous trilobites, including those reported from Kansas and adjacent states, are summarized in text-figure 4.

Crowley, D. J. 1969. Algal-bank complex in Wyandotte Limestone (Late Pennsylvanian) in eastern Kansas. *Kansas Geological Survey, Bulletin 198*, 52 p.

An algal-bank complex in the Wyandotte Limestone (Pennsylvanian) of eastern Kansas contains rare trilobites in the stromatolite-sponge, algal-bank, calcarenite, oolite, and shelly mud facies (table 2).

Davis, J. C. 1959. Reef structure in the Plattsburg and Vilas formations (Missourian) in southeast Kansas. *The Compass of Sigma Gamma Epsilon*, 36:319-335.

A "small trilobite" is listed as present in the Merriam Limestone (Pennsylvanian) at section F, south line of sec. 23, T. 30 S., R. 15 E., a roadcut on highway K96, west of Neodesha, Kansas (p. 331).

Diffendal, R. F., Jr., and R. K. Pabian. 1989. Stop 14. Howard cyclothem exposed on Roy Farwell farm section measured in stream bank, 150 ft south of bridge in NW 1/4 NW 1/4 NE 1/4, sec. 23, T. 1 N., R 12 E., Pawnee County, p. 52-55. In R. K. Pabian and R. F. Diffendal, Jr. (eds.), Late Pennsylvanian and Early Permian Cyclic Sedimentation, Paleogeography, Paleoecology, and Biostratigraphy in Kansas and Nebraska. Nebraska Geological Survey, Guidebook for a pre-meeting field trip in conjunction with the 1989 annual meeting of the Geological Society of America (St. Louis).

Trilobites are indicated as occurring in the Pennsylvanian Nodaway Coal Member of the Severy Formation (fig. 33) at a section in Pawnee County, Nebraska.

Enos, P., D. Herman, L. Watney, and E. Franseen. 1989. Stop 4, I-70/I-435 interchange: Bonner Springs Shale and Plattsburg Limestone, p. 115-125. In W. L. Watney, J. A. French, and E. K. Franseen (eds.), Sequence Stratigraphic Interpretations and Modeling of Cyclothems. Kansas Geological Society, 41st Annual Field Trip, Guidebook.

Trilobites are indicated as occurring "very rarely" in the Merriam Limestone (Pennsylvanian) at NE SW sec. 13, T. 11 S., R. 23 W., Wyandotte County, Kansas (p. 116).

Gheyselinck, R. F. C. R. 1937. Permian trilobites from Timor and Sicily. Unpublished Ph.D. dissertation, University of Amsterdam, 108 p. [Not seen; cited Weller, 1944, p. 327; Mudge and Yochelson, 1962, p. 96; Pabian and Fagerstrom, 1972, p. 815.]

The new manuscript species Phillipsia (Neophillipsia) decurtata, putatively from Permian rocks near Wichita, Kansas, is described.

Gheyselinck's manuscript name was later used by Weller (1944) in a review of Permian trilobite genera. Weller attributed the name to Gheyselinck (1937). Because Weller's paper includes the first published citation of Phillipsia (Neophillipsia) decurtata, the species should be attributed to Gheyselinck in Weller (1944). See additional comments under Weller (1944).

Girty, G. H. 1911. On some new genera and species of Pennsylvanian fossils from the Wewoka Formation of Oklahoma. New York Academy of Sciences, Annals, 21:119-156.

The new species Griffithides parvulus is described from the Wewoka Formation (Pennsylvanian) of Wewoka and Coalgate quadrangles, Oklahoma.

Girty, G. H. 1915. Fauna of the Wewoka Formation of Oklahoma.
U.S. Geological Survey, Bulletin 544, 350 p.

Griffithides parvulus and Ameura sangamonensis are described and illustrated from the Wewoka Formation (Pennsylvanian) of Wewoka and Coalgate quadrangles, Oklahoma.

Grant, R. E. 1966. Late Permian trilobites from the Salt Range, west Pakistan. *Palaeontology* 9:64-73.

Two specimens of Ditomopyge decurtata are illustrated (pl. 13, figs. 4-5). One (pl. 13, fig. 4) is from the Beattie Limestone, near Wichita, Kansas, and the other (pl. 13, fig. 5) is from the Florena Shale Member of the Beattie Limestone, east of Grand Summit, Kansas.

Hahn, G., and R. Hahn. 1967. Zur Phylogenie der Proetidae (Trilobita) des Karbons und Perms. *Zoologische Beiträge*, N.F. 13:303-349.

The phylogenetic relationships of some proetid trilobites, including Ameura sangamonensis and Ditomopyge scitula from Kansas and adjacent areas, are discussed.

Hahn, G., and R. Hahn. 1969. Trilobitae carbonici et permici I,

p. 1-160. In F. Westphal (ed.), Fossilium Catalogus; I: Animalia, Pars 118. Dr. W. Junk N.V., Deventer, Netherlands.

Cheiropyge kansasensis from the Haskell Limestone, north of Lawrence, Kansas is listed (p. 42).

Hahn, G., and R. Hahn. 1970. Trilobitae carbonici et permici II, p. 161-332. In F. Westphal (ed.), Fossilium Catalogus; I: Animalia, Pars 119. Dr. W. Junk N.V., Deventer, Netherlands.

The following trilobite species from Kansas or adjacent areas are listed: Ditomopyge cliftonensis (p. 174-175), D. decurtata (p. 175), D. lansingensis (p. 177-178), D. olsoni (p. 179), D. parvula (p. 181), and D. sp. 5 of Weller (1937) (p. 190). Phillipsia (Griffithides) scitula, the type species of Cyphinium (a junior synonym of Ditomopyge), is listed on p. 172.

Hahn, G., and R. Hahn. 1972. Trilobitae carbonici et permici III, p. 333-531. In F. Westphal (ed.), Fossilium Catalogus; I: Animalia, Pars 120. Dr. W. Junk N.V., The Hague.

The following trilobite species from Kansas or adjacent areas are listed: Ameura major (p. 337-338), and A.

missouriensis (p. 338-340).

Hare, S. J. 1891. Trilobites of the Upper Coal Measure Group at Kansas City, Mo. Kansas City Science 5:33-36.

Phillipsia major and the new species Phillipsia nodocostatus are reported from the Upper Coal Measure Group (Pennsylvanian) at Kansas City, Missouri.

Hattin, D. E. 1957. Depositional environment of the Wreford megacyclothem (Lower Permian) of Kansas. Kansas Geological Survey, Bulletin 124, 150 p.

Ditomopyge is listed as present in calcareous shale units of the Speiser Shale and Wreford Limestone (p. 62) and in cherty limestones of the Wreford Limestone (p. 67). Both occurrences are Permian in age. More specific listed occurrences of trilobites are: ?Ditomopyge from the Havensville Shale Member of the Wreford Limestone (p. 120); trilobite pygidium from the Schroyer Limestone Member of the Wreford Limestone (p. 122); trilobite from the Havensville Shale Member of the Wreford Limestone (p. 129).

Haworth, E. 1896. Resume of the stratigraphy and correlations of the Carboniferous formations. The University Geological Survey of Kansas. Vol. I:145-194.

Phillipsia major is listed from the Oswego Limestone (Pennsylvanian) of Kansas (p. 152).

Heckel, P. H. 1975. Stratigraphy and depositional framework of the Stanton Formation in southeastern Kansas. Kansas Geological Survey, Bulletin 210, 45 p.

Trilobite pieces are reported from calcarenites of the Bolton limestone bed of the Stanton Formation (Pennsylvanian) in southeastern Kansas (p. 20).

Hinds, H., and F. C. Greene. 1917. Leavenworth-Smithville folio, Missouri-Kansas. U.S. Geological Survey, Geological Atlas of the United States, No. 206. 13 p.

Griffithides sp. (as identified by G. H. Girty) is listed from the Kansas City Formation (Pennsylvanian) in the Smithville Quadrangle, Kansas. Phillipsia major (as identified by G. H. Girty) is listed from the Lansing Formation (Pennsylvanian) of Kansas.

Holterhoff, P. F., and R. K. Pabian. 1990 [dated 1989].

Paleoenvironmental implications of a pyritized molluscan fauna from the Bennett Shale Member, Red Eagle Formation (Lower Permian), Richardson County, Nebraska. Compass of

Sigma Gamma Epsilon, 67:35-46.

Ameura and Ditomopyge are listed as present in the Bennett Shale, Howe Limestone, and Roca Shale members of the Red Eagle Formation, Richardson County, Nebraska.

Imbrie, J. 1955. Quantitative lithofacies and biofacies study of Florena Shale (Permian) of Kansas. American Association of Petroleum Geologists, Bulletin, 39:649-670.

Trilobites are reported from the Florena Shale Member of the Beattie Limestone (Permian) in Kansas.

Imbrie, J., L. F. Laporte, and D. F. Merriam. 1964. Beattie Limestone facies (Lower Permian) of the northern Midcontinent, p. 219-238. In D. F. Merriam (ed.), Symposium on Cyclic Sedimentation. Kansas Geological Survey, Bulletin 169(1).

Ditomopyge is listed from two sections in the Beattie Limestone (Permian) of Kansas: Cottonwood Limestone Member at locality 15, NW NW sec. 36, T. 33 S., R. 7 E., Cowley County (p. 235); Florena Shale Member at locality 10, railroad cut in NW SE sec. 36, T. 16 S., R. 9 E., Morris County (p. 237).

Jewett, J. M. 1941. The Geology of Riley and Geary counties, Kansas. Kansas Geological Survey, Bulletin 39, 164 p.

In Cowley, Elk, and Greenwood counties, Kansas, the Florena Shale Member of the Beattie Limestone (Permian) is said to be "remarkable for the presence of excellently preserved complete specimens of a small trilobite" (p. 60).

Keyes, C. R. 1894. Paleontology of Missouri, Part 1. Missouri Geological Survey, 4, 271 p.

Phillipsia major is reported and illustrated from the Pennsylvanian of Missouri.

Lane, N. G. 1958. Environment of deposition of the Grenola Limestone (Lower Permian) in southern Kansas. Kansas Geological Survey, Bulletin 130(3):117-164.

A trilobite pygidium, said to be probably a species of Ditomopyge, is listed from the Neva Limestone Member of the Grenola Limestone (Permian) in southern Kansas (p. 141). Ditomopyge? (possibly the specimen listed on p. 141 -- L.E.B.) is listed from the Neva Limestone Member at locality 2, SE 1/4 sec. 4, T. 31 S., R. 8 E., railroad cuts along Santa Fe Railroad, and in small stream adjoining the railroad, between Murphy oil lease and Grand Summit (p.

160).

Lutz-Garihan, A. B., and R. J. Cuffey. 1976. Ditomopyge and Ameura, trilobites in the Permian Wreford megacyclothem of Kansas, Nebraska, and Oklahoma. Geological Society of America, Abstracts with Programs, 8:989.

Occurrences of Ameura missouriensis and Ditomopyge scitula in the Permian Wreford megacyclothem of Kansas, Nebraska, and Oklahoma are recorded. A. missouriensis is said to occur in only the lower Havensville Limestone of central Kansas. D. scitula is found in the interval from the uppermost Speiser Shale to the middle Schroyer Limestone Member of the Wreford Limestone. Most common in calcareous shale, cherty limestone, and brachiopod-molluscan limestone, it is concluded that D. scitula "preferred off-shore, deeper-water (but still rather shallow), normal-marine paleoenvironments within the Early Permian Mid-Continent shelf sea."

Two pygidia of D. scitula have possible fossilized color markings. They consist of a row of small dark, round spots (one per segment) on the lateral flanks of the axis.

Mapes, R. H., C. G. Maples, and H.-P. Schultze. 1989. Stop 7B: the Hamilton quarries, p. 34-35. In R. K. Pabian and R. F. Diffendal, Jr. (eds.), Late Pennsylvanian and Early Permian

Cyclic Sedimentation, Paleogeography, Paleoecology, and Biostratigraphy in Kansas and Nebraska. Nebraska Geological Survey, Guidebook for a pre-meeting field trip in conjunction with the 1989 annual meeting of the Geological Society of America (St. Louis).

Trilobite fragments are listed as occurring in the conglomeratic sequence in the lower part of the deposit in the Hamilton quarries. The deposit is in the Calhoun Shale, which is Pennsylvanian or Permian in age.

Mather, K. F. 1915. The fauna of the Morrow Group of Arkansas and Oklahoma. Denison University, Scientific Laboratories, Bulletin, 18:244-246.

The new species Griffithides morrowensis is described from the Brentwood Limestone of Sawney Hollow, Adair County, Oklahoma.

McCrone, A. W. 1963. Paleoecology and biostratigraphy of the Red Eagle cyclothem (Lower Permian) in Kansas. Kansas Geological Survey, Bulletin 164, 114 p.

Pygidial and thoracic remains of Permian trilobites (cf. Ditomopyge) are indicated as being present in the Bennett and Glenrock members of the Red Eagle Limestone (p. 37;

figs. 4, 18, 22).

Merriam, D. F. 1989. The Wauneta Limestone, a new member of the Howard Limestone (Wabaunsee Group, Upper Pennsylvanian) in eastern Kansas. Transactions of the Kansas Academy of Science, 92(1-2):107-112.

Ditomopyge is described as locally present in the Utopia Limestone [Member] of the Howard Limestone (Pennsylvanian) in southeastern Kansas.

Merriam, D. F., and C. E. Sorensen. 1982. Geology of the Howard Limestone (Wabaunsee Group, Virgilian Stage, Pennsylvanian) in southeastern Kansas. Kansas Geological Society, Thirty-Fourth Field Conference, Guidebook, p. 1-30.

Ditomopyge is described as being found locally in the Utopia Limestone Member of the Howard Limestone (Pennsylvanian) in southeastern Kansas.

Miller, H. W., and A. Swineford. 1957. Paleoecology of nodulose zone at top of Haskell Limestone (Upper Pennsylvanian) in Kansas. American Association of Petroleum Geologists, Bulletin, 41:2012-2036.

Ditomopyge sp. cf. D. decurtata and Phillipsia major are

listed as occurring in shale beds or goethite above the nodulose zone at the base of the Robbins Shale in Douglas County, Kansas (p. 2027).

Moore, R. C. 1964. Paleocological aspects of Kansas Pennsylvanian and Permian cyclothem, p. 287-380. In D. F. Merriam (ed.), Symposium on Cyclic Sedimentation. Kansas Geological Survey, Bulletin 169(1).

Trilobites listed as being associated with paleoecologic assemblages from the Pennsylvanian or Permian of Kansas are: Ditomopyge, Speiser-type (Derbyia) assemblage (p. 308); Ditomopyge, Florena-type (Neochonetes-Derbyia) assemblage (p. 315); pygidia and other remains, Beil-type (Pulchratia) assemblage (p. 315); Ameura, Ditomopyge, and Paladin, Beil-type (Pulchratia) assemblage (p. 318); Ditomopyge, Threemile (Composita-Fenestrellina) assemblages (p. 332); Ditomopyge, Leavenworth-type (Isogramma) assemblage (p. 335); Ameura, Drum-type (Euconospira) assemblages (p. 341). Fusulinids and trilobites (Ditomopyge) occur together in a marker horizon (unit 6 of the Cottonwood Member of the Beattie Limestone) in southern Kansas or northern Oklahoma (p. 354). Ditomopyge is also listed from the Florena Shale Member of the Beattie Limestone in Cowley, Elk, Greenwood, Chase, Morris, Riley, and Marshall counties, Kansas, and Osage County, Oklahoma (p. 357, fig. 38 [as "T"]).

A species of Ditomopyge is illustrated by a line drawing (Supplement, fig. 2.7).

Moore, R. C., J. C. Frye, and J. M. Jewett. 1944. Tabular description of outcropping rocks in Kansas. Kansas Geological Survey, Bulletin 52(4):137-212.

Well-preserved specimens of a small trilobite are indicated as being locally common in the Florena Shale Member of the Beattie Limestone (Permian) of southern Kansas (p. 166).

Moore, R. C., J. C. Frye, J. M. Jewett, W. Lee, and H. G. O'Connor. 1951. The Kansas rock column. Kansas Geological Survey, Bulletin 89, 132 p.

Well-preserved specimens of a small trilobite are indicated as being locally common in the Florena Shale Member of the Beattie Limestone (Permian) of southern Kansas (p. 47).

Morgan, G. D. 1924. Geology of the Stonewall Quadrangle, Oklahoma. Oklahoma Bureau of Geology, Bulletin 2, 248 p.

Phillipsia major is reported from the Francis Shale (Pennsylvanian) in the shale pit at the brick plant south of Ada, Oklahoma (p. 118). Phillipsia sangamonensis is illustrated from that locality (pl. 53, fig. 11), but not

indicated in the faunal list. P. sangamonensis is also listed from the McAlester, Wewoka, and Holdenville formations (Pennsylvanian).

Mossler, J. H. 1973. Carbonate facies of the Swope Limestone Formation (Upper Pennsylvanian), southeast Kansas. Kansas Geological Survey, Bulletin 206(1):1-12.

In the Swope Limestone (Pennsylvanian) of southeast Kansas, trilobite fragments are listed as occurring in the argillaceous subfacies of the biomicrite facies (p. 8), and the mottled biomicrite facies (p. 10).

Mudge, M. R., and E. L. Yochelson. 1962. Stratigraphy and paleontology of the uppermost Pennsylvanian and lowermost Permian rocks in Kansas. U.S. Geological Survey, Professional Paper 323, 213 p.

Ditomopyge? decurtata is described and illustrated from Cowley County, Kansas. It is present in the Florena Shale Member of the Beattie Limestone and in beds at least 30 m stratigraphically above the Florena Shale Member. Both occurrences are Permian in age. The authors consider Weller (1940) to have been probably correct in considering the Florena Shale Member in Cowley County to have been the origin of Gheyselinck's type specimen.

A specimen of ?Ditomopyge sp. is recorded from the Permian Jim Creek Limestone Member of the Root Shale (p. 97). A pygidium and a cephalon from the Americus Limestone Member of the Foraker Limestone (Permian) are referred with certainty to Ditomopyge (p. 97). Other sclerites of trilobites not referred to genus are noted as occurring in shaly limestone or calcareous shale beds (p. 97).

Newell, N. D. 1931. New Schizophoridae and a trilobite from the Kansas Pennsylvanian. *Journal of Paleontology* 5:260-269.

The new genus and species Ditomopyge lansingensis is described. Syntypes of D. lansingensis are said to have been collected from "the calcareous yellowish shale at the middle of the Plattsburg limestone, Lansing group, on the main highway east of Ottawa, Kansas, near the Franklin County line, middle of the north line of sec. 36, T. 16 S., R. 21 E." The calcareous yellowish shale is the Hickory Creek Shale Member of the Plattsburg Limestone Formation (Pennsylvanian).

Unpublished records in the files of the Kansas Geological Survey differ slightly from Newell's published locality description. A record of a stratigraphic section measured by Newell "10 miles east of Ottawa on Paola road, at county line west of bluff of creek" in "Sec. 27, T. 16 S., R. 21 Franklin Co.," is indicated as "Type loc

Ditomopyge lansingensis." Unit 9 on the section (Hickory Creek Shale Member of the Plattsburg Limestone) is indicated as containing "Ditomopyge lansingensis (types)."

Owens, R. M. 1983. A review of Permian trilobite genera. Special Papers in Palaeontology 30, Palaeontological Association Monographs, p. 15-41.

Ditomopyge decurtata from the Permian of Kansas is illustrated (pl. 4, figs. 1, 2).

Pabian, R. K., and R. F. Diffendal, Jr. 1989. Stop 13A: roadcuts about 2.5 mi south of Humboldt showing mostly early Permian strata of Admire and Council Grove groups, along EL SE 1/4 sec. 21 and WL NW 1/4, sec. 27, T. 2 N., R. 13 E., Richardson County, p. 49-52. In R. K. Pabian and R. F. Diffendal, Jr. (eds.), Late Pennsylvanian and Early Permian Cyclic Sedimentation, Paleogeography, Paleoecology, and Biostratigraphy in Kansas and Nebraska. Nebraska Geological Survey, Guidebook for a pre-meeting field trip in conjunction with the 1989 annual meeting of the Geological Society of America (St. Louis).

Trilobites are indicated as occurring in the Permian Hughes Creek Member of the Foraker Formation (fig. 31) at a section in Richardson County, Nebraska.

Pabian, R. K., and J. A. Fagerstrom. 1968. Biometrical study of morphology of the Pennsylvanian trilobite Ameura sangamonensis (Meek and Worthen). Bulletin of the University of Nebraska State Museum, 8(2):189-207.

Biometrical study of specimens of Ameura sangamonensis from the Bonner Springs Shale (Pennsylvanian) in Cass County, Nebraska suggests that the dominant growth pattern was isometric.

Pabian, R. K., and J. A. Fagerstrom. 1972. Late Paleozoic trilobites from southeastern Nebraska. Journal of Paleontology 46:789-816.

Ameura missouriensis and Ditomopyge scitula are described from Pennsylvanian and Permian (Missourian to Big Blue) strata, and the new species Anisopyge whitei is described from Permian (Big Blue) strata, of southeastern Nebraska. Ditomopyge lansingensis, the type species of the genus, which is from the Pennsylvanian of eastern Kansas, is synonymized under Phillipsia (Griffithides) scitula. The generic name Ditomopyge is used for P. (G.) scitula.

Pabian, R. K., and R. M. Joeckel. 1989. Stop 17. Four mile hill, about 8.5 mi south and 1.0 mi east of Humboldt, SW 1/4

SW 1/4, sec. 14 and SE 1/4 SE 1/4, sec. 15, T. 1 N., R. 13 E., Richardson County, p. 60-62. In R. K. Pabian and R. F. Diffendal, Jr. (eds.), Late Pennsylvanian and Early Permian Cyclic Sedimentation, Paleogeography, Paleoecology, and Biostratigraphy in Kansas and Nebraska. Nebraska Geological Survey, Guidebook for a pre-meeting field trip in conjunction with the 1989 annual meeting of the Geological Society of America (St. Louis).

Trilobites are indicated as occurring in the Permian Neva Member of the Grenola Formation at a section in Richardson County, Nebraska (fig. 37).

Ries, E. R. 1954. Geology and mineral resources of Okfuskee County, Oklahoma. Oklahoma Geological Survey, Bulletin 71, 120 p.

Two trilobites are reported from Pennsylvanian rocks of Okfuskee County, Oklahoma: Ameura sangamonensis from the Wewoka and Holdenville formations (p. 45), and A. major from the Coffeyville Formation (p. 60).

Sayre, A. N. 1930. The fauna of the Drum Limestone of Kansas and western Missouri. The University of Kansas Science Bulletin 19(2), no. 8:75-203. (Reprinted as Kansas Geological Survey, Bulletin 17, 129 p.)

Phillipsia major is described and figured from the oolitic member of the Drum Limestone (Pennsylvanian) of Turner, Elsmore, Cherryville, and Independence, Kansas, and from Kansas City, Missouri.

Shimer, H. W., and R. R. Shrock. 1944. Index Fossils of North America. Massachusetts Institute of Technology Press, Cambridge, Massachusetts, 837 p.

Ditomopyge decurtata is listed and illustrated. The figured specimen is from the Florena Shale Member of the Beattie Limestone (Permian) of Grand Summit, Kansas.

Shumard, B. F., and G. C. Swallow. 1858. Descriptions of new fossils from the Coal Measures of Missouri and Kansas. Academy of Sciences of St. Louis, Transactions, 1:198-227.

Three new species are described: 1) Phillipsia missouriensis Shumard from the "Middle Coal Measures at Lexington, Missouri;" 2) Phillipsia major Shumard from the "Upper Coal Measures" in "Clinton County, Missouri, and in the valley of Verdigris River, and twelve miles south of Lecompton on the Santa Fé road, Kansas Ter.;" and 3) Phillipsia cliftonensis Shumard from "the superior beds of the Upper Coal Measures, at Clifton Park, Kansas Ter."

Taylor, J. D. 1964. Paladin morrowensis (Mather) from Washington County. Oklahoma Geology Notes, 24(2):30-32.

The holotype of Paladin morrowensis from Adair County, Oklahoma is reillustrated, together with additional specimens from Arkansas.

Teichert, C. 1944. Permian trilobites from western Australia. Journal of Paleontology, 18:455-463.

The history of the names Ditomopyge and D. lansingensis (see Newell, 1931; Weller, 1935) is given. Ditomopyge and related genera are discussed.

Toomey, D. F., and R. Mitchell. 1986. Facies Relationships and Paleodepositional Settings of the Herington to Winfield Stratigraphic Interval (Lower Permian), Southern Kansas--Northern Oklahoma. Society of Economic Paleontologists and Mineralogists, 4th Annual Meeting, Midcontinent Section, Field Guidebook, 173 p.

Undetermined trilobites are listed as rarely occurring in the Luta Limestone Member of the Odell Shale (Permian) in Kay County, Oklahoma (table 2), and in the Winfield Limestone in Cowley County, Kansas, and Kay County, Oklahoma

(table 3).

Vogdes, A. W. 1887. The genera and species of North American Carboniferous trilobites. New York Academy of Science, Annals, 4:69-105.

Phillipsia major, which was first described from the Pennsylvanian of Missouri, is listed.

Weaver, J. M. 1936. Geology and mineral resources of Hughes County, Oklahoma. Oklahoma Geological Survey, Bulletin 70, 150 p.

Ameura sangamonensis is listed from the Wewoka and Holdenville formations (Pennsylvanian) of Hughes County, Oklahoma.

Weber, V. N. 1937. Trilobity kamennougolnych i permskych otloshenij SSSR. 1. Kamennougolnye trilobity. [Trilobites of the Carboniferous and Permian systems of the U.S.S.R. 1. Permian trilobites.] Monographie Paleontologichii SSSR 71(1):1-104, 112-113, 160 (Russian), 114-159 (English).

The new genus Cyphinium is erected. Phillipsia scitula is the type species.

Weller, J. M. 1935. Adolescent development of Ditomopyge.
Journal of Paleontology 9:503-513.

Ditomopyge lansingensis, the type species of the genus, is recognized as having been described on the basis of two immature pygidia that possess characters not present in mature specimens. Additional specimens from the type locality (see comments under Newell, 1931) are illustrated by line drawings. An ontogenetic series of specimens from the Pennsylvanian of Warren County, Indiana suggests that tiny spined pygidia of D. lansingensis "are parts of the young of trilobites belonging to the Griffithides scitulus series." Ditomopyge is thus redefined on the basis of its putative mature morphology.

Weller, J. M. 1936. Carboniferous trilobite genera. Journal of Paleontology, 10:704-714.

Carboniferous trilobite genera are reviewed. Ditomopyge is recognized (type species, D. lansingensis from the Pennsylvanian Plattsburg Formation of Kansas). Among proposed new genera is Ameura (type species, Phillipsia sangamonensis, which is cited as a junior synonym of A. missouriensis), and Paladin (type species, Griffithides morrowensis).

Weller, J. M. 1937. Evolutionary tendencies in American Carboniferous trilobites. *Journal of Paleontology*, 11:337-346.

Evolutionary patterns among some Mississippian and Pennsylvanian trilobites from North America are described. Illustrations of trilobites from Kansas, Missouri, Nebraska, or Oklahoma include Ditomopyge olsoni, D. scitula, D. lansingensis, and D. n. sp. from the Florena Shale.

Weller, J. M. 1944. Permian trilobite genera. *Journal of Paleontology*, 18:704-714.

Permian trilobite genera and subgenera are reviewed.

Gheyselinck's (1937) manuscript species Phillipsia (Neophillipsia) decurtata is first published. The species should therefore be attributed to Gheyselinck in Weller (1944). A brief history of the holotype is presented. The specimen, "which is preserved in the University of Amsterdam, had been obtained from Ward's Scientific Establishment about twenty years before [the time of Gheyselinck's manuscript] and was originally labeled "Phillipsia sangamonensis, Pennsylvanian, Wichita, Kansas.'" The specimen is "identical in form and preservation to numerous specimens that I have examined from southern Kansas, particularly from the Florena shale near Grand

Summit, Cowley County, and from the Eskridge shale in Greenwood County, which I had described in manuscript under another name."

The new species Cheiropyge kansasensis is described from the "top of Haskell Limestone (Lower Permian), Leavenworth [sic; should read Leavenworth] County, about 15 miles north of Lawrence, Kansas."

Weller, J. M. 1959. Family Phillipsiidae Oehlert, 1886, p. 0399-0403. In R. C. Moore (ed.), Treatise on Invertebrate Paleontology, Part O, Arthropoda 1. Geological Society of America and University of Kansas Press, Boulder, Colorado and Lawrence, Kansas.

Species present in Pennsylvanian rocks of Kansas, Missouri, Nebraska, or Oklahoma that are listed and illustrated are Ditomopyge scitula and D. lansingensis.

Weller, S. 1898. Bibliographic index of North American Carboniferous invertebrates. U.S. Geological Survey, Bulletin 153, 653 p.

Pennsylvanian trilobites listed include Phillipsia major, P. missouriensis, P. nodocostatus, and Proetus longicaudus.

Whittington, H. B. 1954. Two silicified Carboniferous

trilobites from west Texas. Smithsonian Miscellaneous Collections, 122(10):1-16.

The holotype of Griffithides morrowensis from the Brentwood Limestone of Sawney Hollow, Adair County, Oklahoma is reillustrated and reassigned as Paladin (Paladin) morrowensis.

Williams, H. S. 1881. On the occurrence of Proetus longicaudus Hall. American Journal of Science, 121 (series 3, vol. 21):156.

Two specimens of Proetus longicaudus are reported from "a blue limestone near Madison, Greenwood County, Kansas." The locality, according to Edwin Walters, the collector, is "on the border of the Upper Carboniferous, the Permian and Cretaceous with an occasional indication of a Jurassic Age."

Williams, J. S. 1933. A new Pennsylvanian trilobite from Missouri. Journal of the Washington Academy of Science, 23:429-435.

The new species Griffithides olsoni is described from two complete specimens collected from the lower part of the Cherokee shale (Pennsylvanian) near Columbia, Missouri.

Wilson, F. W., and D. Bennett. 1985. The land, p. 13-37. In J. T. Collins (ed.), Natural Kansas. University of Kansas Press, Lawrence.

Trilobites are listed as having been found in the Beal and Oread limestones of Douglas and Shawnee counties (p. 21). A reconstruction of a trilobite (species indeterminate!) is on page 22.