IV

DEVONIAN FAUNA

By

THOMAS EDMUND SAVAGE

THE DEVONIAN FAUNA OF KENTUCKY

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INTRODUCTION

THE DEVONIAN FAUNAS OF KENTUCKY.

The Devonian faunas known in Kentucky represent middle and upper Devonian time, and correspond in age with a part of the Onondaga, Hamilton, Tully, and Genesee divisions of the New York section as shown in the table given below. It seems almost certain that lower Devonian seas submerged portions of western Kentucky, for sediments and faunas of Helderberg and Oriskany time are known to the south in Tennessee and to the north and west in Illinois and Missouri. However, if these early Devonian seas di-d spread over parts of western Kentucky, the sediments and fossils that were deposited in them were all removed by erosion before the middle Devonian and younger strata that are now found in the region were laid down. It. is possible that patches of lower Devonian sediments and fossils may still be present in western Kentucky, but if they are, such places are covered and concealed by younger strata.

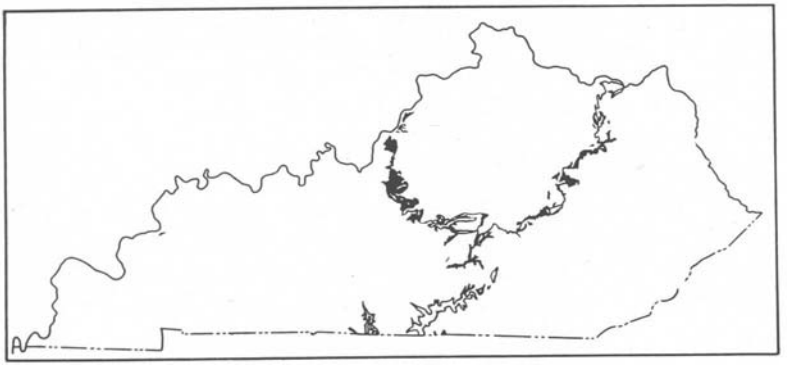


Fig. 27. Map showing the distribution of the Devonian Strata in Kentucky. A narrow strip of the Devonian shale, too small to be shown at this scale is found on the north-west side of Pine Mountain.

The relative age of the Devonian formations present in Kentucky, and the relation of these faunas to those of the middle and upper Devonian in adjacent states, are shown on the comparative table given below:

Comparative Table of Devonian Formations

Equivalents in New York	Southern Illinois	Central Kentucky	Southern Indiana	Ohio
Genessee shale Tully limestone	Mountain Glen shale Alto Formation	New Albany shale Duffin limestone	New Albany shale	
Hamilton limestone Marcellus shale	Lingle limestone Misenheimer shale	Sellersburg limestone: Casey, Beechwood, Silver Creek	Sellersburg limestone: Silver Creek, Beechwood	Delaware limestone
Onondaga limestone	Grand Tower limestone Dutch Creek sandstone Clear Creek chert	Jeffersonville limestone	Jeffersonville limestone	Columbus limestone

DISTRIBUTION OF THE DEVONIAN FAUNAS

Devonian strata and fossils occur in Kentucky immediately below the mantle rocks over a belt. a few, to several, miles wide bordering the Blue Grass area on both sides of the Cincinnati anticline, from above Louisville south to Larue County on the west, thence east across Marion, Boyle, Lincoln and Garrard counties, and thence northeast towards the Ohio River in the vicinity of Vanceburg, in Lewis County. South of this main area they are found in patches of greater or less size along several of the streams as far as the Kentucky-Tennessee line.

It is not meant to be understood, however, that the Devonian faunas are the same everywhere in the areas above mentioned. The typical Jeffersonville fauna is found in abundance only in the vicinity of Louisville, near the north end of the belt on the west side of the Cincinnati anticline. The typical Sellersburg fauna is developed in the Louisville region, and farther north in southern Indiana, where it is separable into the Silver Creek fauna below and the Beechwood fauna above. The typical Silver Creek fauna, like the Jeffersonville, is found in Kentucky only in the vicinity of Louisville, but elements of the Beechwood fauna can be recognized along the west side of the Cincinnati anticline as far south as Allen County, on the south border of the State.

Along the east side of the Cincinnati anticline the middle Devonian fauna is not so typically Beechwood, nor does it closely resemble that of the Silver Creek or Jeffersonville as the latter faunas appear at Louisville. The species are dominantly Hamilton, although associated with the Hamilton forms are others that are frequently found in the Onondaga. Because of the somewhat mixed character of the Middle Devonian fauna on the east side of the Cincinnati axis, Foerste has called the strata in which this fauna occurs the Boyle limestone. On the east side of the Cincinnati anticline the Tully fauna has been recognized in Estill and Powell counties.

The Genesee fauna is much more widespread than the Tully, or even than the older middle Devonian faunas. It is found almost everywhere the New Albany shale is exposed in this region.

SOURCES AND RELATIONSHIPS OF THE DEVONIAN FAUNAS

The earliest middle Devonian sea that entered this region came up from the south, and brought with it a fauna from South America. This is the Clear Creek fauna of Illinois and the Camden fauna of Tennessee. Its southern origin is indicated by the presence in both regions of such brachiopod species as *Anoplia nucleata, Amphigenia elongata. Anoplotheca flabellites, Leptostrophia perplana,* and species of *Rhipidomella.* In the South American Devonian fauna there also occur species that, are nearly related to those belonging to the genera *Actinopteria, Modiomorpha, Platyceras, Productella,* and *Spirifer* which are also found in the Clear Creek chert of southern Illinois.

The later Onondaga fauna of the lower Mississippi valley region includes that of the Grand Tower limestone of Illinois, and also that of the Jeffersonville limestone of Kentucky and Indiana. This fauna is thought to have been derived from the same source as that of the Clear Creek chert, and to have entered this region from the south, as did the chert fauna. Evidence of this is seen in the similarity of a number of the species of the middle Devonian faunas of South America and the lower Mississippi Valley areas.

Weller and Stauffer assumed that the coral and cephalopod elements of the Onondaga fauna came from western Europe around the north Atlantic basin, and entered the New York region by way of Hudson Bay.

However, it seems somewhat more probable to the writer that the sea which brought the Grand Tower and Jeffersonville faunas into the Illinois and Kentucky areas came up from the south, and covered southwest Illinois and adjacent portions of Missouri some time before it reached the vicinity of Louisville, Kentucky, as shown in the comparative table of the Devonian faunas in Kentucky and bordering States. In Kentucky the layers containing very numerous shells of *Spirifer gregarius* occur near the base of the Jeffersonville limestone, while in Illinois this *Spirifer gregarius* zone is found at the top of the Grand Tower limestone. In Kentucky the strata containing *Spirifer acuminatus* are present in the Jeffersonville limestone a number of feet above the *Spirifer gregarius* zone, while in Illinois the horizon of upper Jeffersonville strata containing *Spirifer acuminatus* is absent, but there are present in Illinois a thickness of 40 or more feet of Grand Tower (Onondaga) strata below the coral reef zone which are entirely absent in Kentucky. In these lower Grand Tower strata there occurs a zone containing abundant remains of the trilobite *Dalmanites (Odontocephalus) aegeria* which is scarcely found in Kentucky, indicating that the deeper part of the sea in this region during Onondaga time was to the west and northwest of Louisville, and that the Jeffersonville fauna of Kentucky represents late Onondaga time.

The Hamilton fauna in Kentucky is represented by that of the Sellersburg. It is thought to have been derived from the modification of the late Onondaga fauna mingled with another migration from a southern source. This migration is indicated by the presence in the Hamilton fauna of such species as *Tropidoleptus carinatus, Vitulina pustulosa,* in the Devonian of both regions, and of other species in the South American area that seem to be nearly related to *Chonetes scitula, Spirifer audaculus, Modiomorpha concentrica, Leda diversa, Pholadella paralella, Actinopteria boydi,* and *Cryphaeus boothi.*

The upper Devonian faunas represented in Kentucky are the Tully and the Genesee. The former is found in the Duffin layer, and the latter is present in the New Albany shale.

The Tully fauna is largely composed of modified holdovers of the Hamilton fauna, plus a number of immigrants of species like *Hypothyris cuboides* which probably came from western Europe where these species were common. However, *Hypothyris cuboides* was also present in the lower-upper Devonian fauna that came down the Mackenzie River basin from northern Asia. None of the Tully species appears to have near relatives in the Devonian of South America, which precludes the possibility of the migrant element of this fauna coming from that source.

This Euro-Asiatic fauna entered the interior of North America from the north either by way of Hudson Bay or the North Atlantic. If by the latter route, it may have entered through the Connecticut River gateway and spread southwest-ward from the New York area into Kentucky.

The Genesee fauna also probably had a European source, although John M. Clarke has called attention to a possible southern element in this fauna. It probably gained entrance to the Kentucky region by the same route as the preceding Tully fauna. It contains a relatively small number of species, many of which are inarticulate brachiopods as is common in such black shale deposits as the New Albany.

THE JEFFERSONVILLE FAUNA

The fauna of the Jeffersonville limestone in Kentucky is remarkable for its fine preservation, and for the great number and variety of the species it contains, more than 400 having been reported from the Louisville region. The waters of the Jeffersonville sea in this region were warm and clear, and reef building corals grew in great profusion, 178 species of these fossils have been reported from the Falls of the Ohio locality. These corals were figured by Davis in his report on Kentucky Fossil Corals. Brachiopods and mollusks are also numerous, and early attracted the attention of paleontologists. Nettleroth figured and described a large number of these in his report

entitled Kentucky Fossil Shells, published by the Kentucky Geological Survey. Hall and Ulrich have studied the bryozoa fauna. Ulrich has described the ostracods of this limestone; and Kindle has studied the trilobites.

Charles Butts[1] has compiled the following list of species that have been reported from the Jeffersonville limestone of this region, and several of the more common and characteristic species of this fauna are figured on Plates XXVII-XXIX of this paper.

List of Fossils from the Jeffersonville Limestone

CORALS

Acrophyllum clarki Davis
A. ellipticum Davis
A. oneidaense Billings
Alveolites constans Davis
A. minimus Davis
A. mordax Davis
A. squamosus Billings
Aulacophyllum conigerum Davis
A. insigne Davis
A. mutabile Davis
A. parvum Davis
A. sulcatum D'Orbigny
A. unguloideum Davis
Aulopora cornuta Billings
A. culmula Davis
A. edithana Davis
A. procumbens Davis
A. serpens Goldfuss
Blothrophyllum approximatum Nicholson
B. cinctutum Davis
B. corium Davis
B. decorticatum Billings
B. liratum Davis
B. louisvillense Davis
B. parvulum Davis
B. sessile Davis
B. zaphrentiforme Davis
Chonophvllum magnificum Billings
C. multiplicatum Davis
Cladopora acupicta Davis
C. alpenensis Rominger
C. aspera Rominger
C. billingsi? Rominger
C. bifurca Davis
C. crassa Davis
C. cryptodens Billings
C. dentata Davis
C. desquamata Davis
C. dispansa Davis
C. expatiata Rominger

[1]Kentucky Geol. Survey, Series IV, Vol. 3, pt. 2, pp. 106-l15, 1915.

C. fibrata Davis
C. francisci Davis
C. gracilis Davis
C. imbricata Rominger
C. iowaensis Owen
C. labiosa Billings
C. pinguis Rominger
C. pulchra Rominger
C. radula Davis
C. ricta Davis
C. rimosa Rominger
C. robusta Rominger
C. roemeri?
C. tela Davis
Cyathophyllum brevicorne Davis
C. coralliferum? Davis
C. corniculum Lesueur
C. (Acervularia) davidsoni Edwards and Haime
C. detextum Davis
C. fimbriatum Davis
C. flos Davis
C. greeni Davis
C. ligatum Davis
C. multigemmatum Davis
C. oedipus Davis
C. ovoideum Davis
C. pocillum Davis
C. pumilus Davis
C. robustum Hall
C. rugosum Hall
C. winchelli Davis
Cystiphyllum cicatriciferum Davis
C. cayugaense? Davis
C. edwinanum Davis
C. grande Billings
C. hispidum Davis
C. limbatum Davis
C. lineatum Davis
C. nettelrothi Davis
C. os Davis
C. plicatum Davis
C. squamosum Nicholson
C. sulcatum Hall
C. theissi Davis
C. tumidosum Davis
C. vesiculosum Goldfuss
Dendropora elegantula Billings
D. proboscidalis Rominger
Diphyphyllum bellis Davis
D. coagulatum Davis
D. coalescens Davis
D. conjunctum Davis
D. gigas Rominger
D. panicum Davis
D. strictum Edwards and Haime
D. verneuilianum Edwards and Haime
Drymopora (Syringopora) commensalis Davis
D. (Syringopora) fascicularis
D. (Syringopora) intermedia Nicholson

D. (Syringopora) nobilis Billings
Eridophyllum arundinaceum Billings
E. simcoense Billings
Favosites amplissimus Davis
F. arbor Davis
F. baculus Davis
F. canadensis Billings
F. cariosus Davis
F. clausus Rominger
F. clelandi Davis
F. convexus Davis
F. cymosus Davis
F. digitatus Rominger
F. emmonsi Rominger
F. epidermatus Rominger
F. frutex Davis
F. fustiformis Davis
F. hemisphericus and varieties Troost
F. impeditus Davis
F. intertextus Rominger
F. limitaris Rominger
F. mundus Davis
F. ocellatus Davis
F. pirum Davis
F. proximus Davis
F. quercus Davis
F. radiatus Rominger
F. radiciformis Rominger
F. ramulosus Davis
F. spiculatus Davis
F. tuberosus
Hadrophyllum d'Orbignyi Edwards and Haime
Heliophyllum (Cyathophyllum) colligatum Billings H. (Cyathophyllum) exigum Billings
H. (Cyathophyllum) halli Edwards and Haime H. (Cyathophyllum) infoveatum Davis
H. (Cyathophyllum) multicrena Davis
Michelinia clappi
M. corrugata Davis
M. cylindrica Edwards
Platyaxum (Cladopora, Pachypora) canadense Rominger
P. corioideum Davis
P. fischeri Billings
P. foliatum Davis
P. turgidum Billings
P. undosum Davis
Procteria michelinoidea Davis
P. papillosa Davis
Ptychophyllum coniferum Davis
P. diaphragma Davis
P. tropeum Davis
P. typicum Davis
Romingeria incrustans Davis
R. umbellifera Billings
R. uva Davis
Striatopora alba Davis
S. linnaeana Billings
Syringopora bouchardi Nicholson

S. hisingeri Billings
S. perelegans Billings
S. straminea Davis
S. tabulata Edwards and Haime
S. tubiporoides Yandell and Shumard
Thecia ramosa Rominger
Zaphrentis compressa Edwards
Z. (Cleisophyllum) conigera Billings
Z. exilis Davis
Z. gigantea Lesuer
Z. greenana Davis
Z. immanis Davis
Z. linneyi Davis
Z. macconathi Davis
Z. nodulosa Rominger
Z. prolifica Billings
Z. rafinesque Edwards and Haime
Z. romingeri Davis
Z. torquata Davis
Z. trigemma Davis
Z. yandelli E. and H.

ECHINODERMATA

Ancyrocrinus spinosus Hall
Codaster americanus Shumard
C. pyramidatus Shumard
Dolatocrinus lacus Lyon
D. marshi Lyon
Megistocrinus knappi Lyon and Casseday M. spinulosus Lyon
Nucleocrinus angularis Lyon
N. greeni Miller and Gurley
N. venustus Miller and Gurlev
N. verneuili Troost
Poteriocrinus cylindricus Lyon
P. simplex Lyon

BRYOZOA

Botryelopora socialis Nicholson
Buskopora bistriata Hall
B. dentata Ulrica
B. pyriformis Hall
Chaetetes ponderosus Hall
C. tenuis Hall
Clonopora semireducta Hall
Coscinium cribriforme Prout
Cystopora geniculata Hall
Cystodictya gilberti Meek
C. ovatipora Hall
C. vermicula Hall
Dekayia devonica Ulrich
Discotrypa devonica Ulrich
Eridopora clivulata Hall
E. denticulata Hall
Fenestella aequalis Hall
F. cultrata Hall
F. curvijunctura Hall
F. depressa Hall
F. perplexa Hall
F. proutana Miller

F. pulchella Ulrich
F. serrata Hall
F. singularitas Hall
F. stellata Hall
F. tenella Hall
F. variapora Hall
F. verrucosa Hall
Fenestrapora infraporosa Ulrich
Fistulipora alternata Hall
F. conulata Hall
F. geometrica Hall
F. granifera Hall
F. normalis Ulrich
F. ovata Hall
F. subcava Hall
F. substellata Hall
Glossotrypa paliformis Hall
Hederella adnata Davis
H. canadensis Nicholson
H. cirrhosa Hall
Helicopora ulrichi Claypole
Hemitrypa cribosa Hall
Hernodia humifusa Hall
Intrapora puteolata Hall
Lichenotrypa longispina Hall
Lioclema intercellatum Hall
Orthopora regularis Hall
O. rhombifera Hall
Phractopora cristata Hall
Phyllopora aspera Ulrich
Polypora aculeata Hall
P. blandida Ulrich
P. celsipora minor Hall
P. intermedia Prout
P. laevistriata Hall
P. levinodata Hall
P. quadrangularis Hall
P. striatopora Hall
P. shumardi Prout
P. submutans Hall
P. transversa Ulrich
Prismopora spasipora Hall
P. triquetra Hall
Ptiloporella bifurca Ulrich
Reteporidra adnata Hall
Rhombopora lineinoides Ulrich
R. lineinoides-humilis Ulrich
Scalaripora scalariformis Hall
S. subconcava Hall
Selenopora circincta Hall
S. complexa Hall
Semicoscinium biimbricatum Hall
S. biserrulatum Hall
S. interruptum Hall
S. latijuncturum Hall
S. lunulatum Hall
S. permarginatum Hall
S. planodorsatum Ulrich
S. rhomboideum Prout

S. semirotundum Hall
S. tortum Hall
S. tuberculatum Prout
Strotopora perminuta Ulrich
Thamniscus nanus Hall
Trematella annulata Hall
T. arborea Hall
Unitrypa acaulis Hall
U. anonyma Hall
U. fastigata Hall
U. tegulata Hall

BRACHIOPODA

Athyris fultonensis Swallow = A. vittata
Atrypa ellipsoida Nettelroth
A. reticularis Linnaeus
Camarotoechia carolina Hall
C. tethys Billings
Chonetes mucronatus Hall
Cranaena (Terebratula) romingeri Hall
Cyrtina crassa Hall
Eunella (Terebratula) harmonia Hall
E. (Terebratula) lincklaeni Hall
Meristella nasuta Conrad
Nucleospira concinna Hall
Parazyga (Trematospira) hirsuta Hall
Pentamerella arata Conrad
P. pavilionensis Hall
P. thusnelda Nettleroth
Pholidostrophia iowaensis Owen = Strophodonta nacrea
Productella semiglobosa. Nettelroth
Rhynchonella louisvillensis Nettelroth
R. tenuistriata Nettleroth
Schuchertella (Streptorhynchus) chemungensis arctistriata Hall
Spirifer acuminatus Conrad
S. arctisegmentum Hall
S. audaculus Conrad
S. davisi Nettelroth
S. divaricatus Hall
S. duodenarius Hall
S. fornacula Hall
S. gregarius Hall
S. grieri Hall
S. raricosta Hall
S. segmentum Hall
S. varicosus Hall
Stropheodonta demissa Conrad
S. hemispherica Hall
S. inequistriata Conrad
S. perplana Conrad
S. plicata Hall
Terebratula jucunda Hall

PELECYPODS

Actinopteria boydi Conrad
Aviculopecten fasciculatus Hall
A. pecteniformis Conrad

A. princeps Conrad
Conocardium cuneus Conrad
Cypricardinia cataracta Conrad
Glyptodesma cancellata Nettleroth
Glyptodesma occidentale Hall
Goniophora truncata Hall
Modiomorpha affinis Hall
M. mytiloides Conrad
Paracyclas elliptica Hall

GASTROPODS

Bucania devonica Hall and Whitfield
Callonema bellatulum Hall
C. clarki?
C. imitator Hall and Whitfield
Cyclonema multilirata Hall
Murchisonia desiderata Hall
Platyceras bucculentum Hall
P. compressum Nettelroth
P. conicum Hall
P. dumosum Conrad
P. dumosum var rarispinum Hall
P. erectum Hall
P. milleri Nettelroth
P. multispinosum Meek
P. rictum Hall
P. symmetricum Hall
P. thetis Hall
P. ventricosum Conrad
Platyostoma turbinatum Hall
Pleuronotus (Euomphalus) decewi Billings
Pleurotomaria arabella Nettelroth
P. lucina Hall
P. procteri Nettelroth
P. sulcomarginata Conrad
Strophostylus varians Hall
Trochonema rectilatera Hall
T. yandellana Hall and Whitfield
Turbo shumardi De Verneuil

CEPHALOPODS

Gomphoceras sp
Goniatites discoideus Hall
Gyroceras inelegans Meek

OSTRACODS

Leperditia subrotunda Ulrich
Isochilina rectangularis Ulrich
Aparchites inornatum Ulrich
Beyrichia lyoni Ulrich
B. kolmodini Jones
Ctenobolbina spinulosa Ulrich
C. armata Ulrich
C. cavimarginata Ulrich
C. insolens Ulrich
C. papillosa Ulrich
C. informis Ulrich
C. antespinosa Ulrich
Kirkbya subquadrata Ulrich

K. parallela Ulrich
K. semimuralis Ulrich
K. cymbula Ulrich
K. germana Ulrich
Bollia ungula Jones
B. obesa Ulrich
Halliella retifera Ulrich
Octonaria stigmata Ulrich
O. stigmata var. loculosa Ulrich
O. ovata Ulrich
O. clavigera Ulrich
Bythocypris devonica Ulrich
B. punctulata Ulrich
B. indianensis Ulrich
Pachydomella tumida Ulrich
B. punctostriata Ulrich
B. punctostriata var. curta Ulrich
B. pulchella Ulrich

TRILOBITES

Calymene platys Green
Dalamanites (Odontocephalus) aegeria Hall
D. anchiops Green
D. aspectans Conrad
D. helena Hall
D. pleuroptyx Green
D. selenurus Hall and Clarke
Lichas sp.
Phacops cristata Hall
P. cristata var. pipa Hall and Clarke
P. rana Green
Proetus canaliculatus Hall and Clarke
P. clarus Hall
P. crassimarginatus Hall
P. microgemma Hall and Clarke

THE SELLERSBURG FAUNA.

In the vicinity of Louisville the Sellersburg fauna is separable into the Silver Creek below and the Beechwood fauna above. The number of species in the Silver Creek fauna is much smaller than that in the Beechwood, but the number of individuals of the species is commonly more numerous.

THE SILVER CREEK FAUNA. The species making up the Silver Creek fauna in the vicinity of Louisville include the following: *Zaphrentis sp.*, a few fragmentary byrozoa, *Athyris vittata, Atrypa reticularis, A. spinosa, Chonetes yandellanus, Cyrtina hamiltonensis, C. hamiltonensis* var. *recta, Eunella lincklaeni, Glossina (Lingula) triangulata, Meristella haskinsi, Spirifer byrnesi, S. fornacula, S. oweni, S. varicosus, Stropheodonta concava, S. (Leptostrophia) perplana, Tropidoleptus*

carinatus, Aviculopecten crassicostatus, Paracyclas elliptica, P. lirata, Polyphemopsis louisvillae, and *Nautilus maximus.*

A few of the more common and diagnostic of these species are figured on Plate XXX of this paper.

THE BEECHWOOD FAUNA. The Beechwood fauna is much larger than that of the Silver Creek, although the thickness of the rocks from which it is obtained in this region is only about half as great, being less than 10 feet. Corals are much more numerous, as are crinoids; and practically all of the classes of fossils in the Silver Creek fauna are represented in the Beechwood by a considerably greater number of species. Charles Butts[2] has prepared the following list of fossils from the Beechwood limestone:

List of Fossils from the Beechwood Limestone Member

CORALS

Alveolites goldfussi Billings
A. scandularis Davis
Antholites speciosus
Aulacophyllum conigerum Davis
Aulopora cornuta Billings
Chonophyllum nanum Davis
Cladopora alicornis Davis
C. gulielmi Davis
C. pinguis Rominger
Cyathophyllum ethelanum Davis
C. insigne Davis
C. pustulosum Davis
C. scyphus Rominger
C. tornatum Davis
C. trauthanum Davis
Cystiphyllum americanum Edwards and Haime C. ohioense Nicholson
Dendropora alternans Rominger
D. neglecta Rominger
D. ornata Rominger
D. osculata Davis
Diphyphyllum (Crepidophyllum) archiaci Billings
Drymopora auloporoidea Davis
D. frutectosa Davis
Favosites cavernosus
F. digitatus Rominger
F. goodwini Davis
F. eximius Davis
F. placenta Rominger
F. rotundituba Davis Heliophyllum juvene Rominger
H. infoveatum Davis
Michelinia insignis Rominger
M. plana Davis

[2] Kentucky Geol. Survey, Series IV, Vol. 3, P. 2, pp. 126-128, 1915.

Zaphrentis cornalba Davis
Z. explanata Davis
Z. gallicalcar Davis
Z. nettelrothi Davis
Z. nodulosa Rominger
Z. reynoldsi Davis
Z. trigemma Davis
Z. ungula Rominger

CRINOIDS

Ancyrocrinus bulbosus Hall
Dolatocrinus bulbaceus Miller and Gurley
D. greeni Miller and Gurley
D. tuberculatus Wachsmuth and Springer
Gennaeocrinus kentuckiensis Shumard
Megistocrinus depressus Hall
M. rugosus Lyon and Casseday

BRACHIOPODS

Ambocoelia umbonata Conrad
Athyris fultonensis Swallow
Atrypa spinosa Hall
Camarotoechia sappho Hall
Centronella glansfagea Hall
Chonetes acutiradiatus Hall
Crania sheldoni White=C bordini Hall and Whitfield
Cyrtina hamiltonensis Hall
C. hamiltonensis var recta Hall
Delthyris (Spirifer) sculptilis Hall
Orbiculoidea (Discina) doria Hall
Pentagonia (Meristella) unisulcata Conrad
Pholidostrophia iowaensis Owen
Productella spinulicosta Hall
Rhipidomella (Orthis) goodwini Nettleroth
R. (Orthis) livia Billings
R. (Orthis) vanuxemi Hall
Schizophoria (Orthis) striatula Schlotheim
Schuchertella chemungensis arctistriatus Hall (Strep-
torhynchus arctostriata Nettelroth)
Spirifer audaculus Conrad
S. hobbsi Nettelroth
S. macconathi Nettelroth
S. oweni Hall = Spirifer granulosus
S. segmentum Hall
S. varicosus Hall
Stropheodonta concava Hall
S. demissa Conrad
S. perplana Conrad

PELECYPODS

Aviculopecten princeps
Clinopistha antiqua Meek
C. striata Nettelroth
C. subnasuta Hall and Whitfield
Grammysia gibbosa Hall and Whitfield
Limoptera cancellata Hall
Modiomorpha affinis Hall
M. alta Conrad
M. charlestowensis Nettelroth

M. concentrica Conrad
M. mytiloides Conrad
Nucula herzeri Nettleroth
N. neda Hall and Whitfield
N. niotica Hall and Whitfield
Paracyclas elongata Nettelroth
P. ohioensis Meek
Ptychodesma knappiana Hall
Yoldia valvulus Hall and Whitfield

GASTROPODS

Bellerophon leda Hall
Euomphalus sampsoni Nettelroth
Loxonema hamiltoniae Hall
L. hydraulicum Hall and Whitfield
L. laeviusculum Hall
L. rectistriatum Hall
Platyceras conicum Hall
P. dumosum Conrad
P. echinatum Hall
P. rarispinum Hall
P. lineatum Conrad

PTEROPODS

Tentaculites scalariformis Hall

CEPHALOPODS

Gomphoceras oviforme Hall
G. turbiniforme Meek and Worthen

OSTRACODS

Kirkbya sp.?

TRILOBITES

Dalmanites calypso Hall and Clarke
Phacops rana Green
Proetus macrocephalus Hall

THE BOYLE FAUNA

Foerste proposed the name Boyle limestone for the middle Devonian limestone along the east side of the Cincinnati anticline because this limestone appeared to furnish an equivocal fauna containing a mixture of Onondaga and Hamilton species. The following species have been reported as from the middle Devonian limestone on the east side of the Cincinnati axis and hence make up the Boyle fauna:

List of Fossils from the Boyle Limestone

CORALS

Amplexus yandelli Ed. and H.
Blothrophyllum cinctutum Davis
B. decorticatum Billings
B. houghtoni Davis
B. zaphrentiforme Davis

Cyathophyllum sp.
Cytiphyllum americanum Ed. and H.
Favosites epidermatus Rominger
F. eximius Davis
F. goodwini Davis
F. limitaris Rominger
F. placenta Rominger
Heliophyllum halli Ed. and H.
H. osculatum
Michelinia insignis Rominger
M. plana Davis
Phillipsastrea gigas Billings
Syringopora sp.
Trachypora ornata Davis
Zaphrentis gigantea Lesueur
Z. prolifica Billings
Z. sp.

CRINOIDEA

Dolatocrinus sp.
Megistocrinus sp.

BRACHIOPODA

Ambocoelia umbonata Conrad
Athyris spiriferoides Hall
A. vittata Hall
Atrypa reticularis Linn
Camarotoechia cf. carolina
C. horsfordi Hall
C. sappho Hall
Centronella glansfagea Hall
Chonetes coronatus Conrad
C. yandellanus Hall
Crania favincola
Cyclorhina nobilis Hall
Cyrtina hamiltonensis Hall
Delthyris sculptilis Hall
Eunella harmonia Hall
Lingula sp.
Orbiculoidea cf. doria Hall
O. cf. media Hall
Pentagonia unisulcata Conrad
Pentamella arata Conrad
P. pavilonensis Hall
Productella spinulicosta Hall
Reticularia fimbriata Conrad
Rhipidomella cf. livia Billings
R. vanuxemi Hall
Schuchertella chemungensis var arctistriata Hall
Spirifer byrnesi Nettelroth
S. fornacula Hall
S. granulosus Conrad
S. grieri Hall
S. manni Hall
S. segmentum Hall
S. varieosus Hall
Stropheodonta concava Hall
S. demissa Conrad

S. (Leptostrophia) perplana Conrad
Tropidoleptus carinatus (Conrad)

PELECYPODA

Actinopteria cf. boydi Conrad
Aviculopecten cf. princeps Conrad
Conocardium sp.
Cypricardinia cf. indenta Conrad
Platyceras bucculentum Hall
P. carinatum Hall
P. conicum Hall
P. sp.
Platyostoma lineatum Conrad
Strophostylus varians Hall

PTEROPODA

Tentaculites bellulus Hall

CEPHALPODA

Orthoceras sp.

TRILOBITA

Phacops rana Green
Proetus cf. clarus

It will be seen from the above list of species that the Boyle fauna is quite distinctly that of the Hamilton.

THE CASEY FAUNA

Along the south and southeast side of the Blue Grass region the writer has distinguished a cherty limestone resting in apparent, unconformity on the Beechwood limestone or its equivalent in that region, to which the name Casey limestone was applied. The fauna of this upper-middle Devonian limestone in this region is not large, nor is it distinctly different from that of the Boyle limestone in the same region as may be seen from the following list of fossils from this limestone: *Favosites eximius, F. goodwini, F. cf. epidermatus, Ambocoelia umbonata, Pentamerella pavilionensis, Productella spinulicosta, Reticularia fimbriata, Rhipidomella vanuxemi, Spirifer segmentum, S. varicosus, Stropheodonta concava, Platyostoma lineatum.*

The fossils of the Casey indicate that the sedimentary break at the base of this limestone was a relatively short one.

THE DUFFIN FAUNA

In the Devonian area lying south and southeast of the Bluegrass region, on the east side of the Cincinnati anticline, Foerste has distinguished as the Duffin layer or bed a more or

less dolomitic limestone lying immediately below the New Albany shale, and unconformable on the middle Devonian limestone. In Estill and Powell counties this Duffin bed furnished a Tully fauna, which was also present in lenses or bands of similar limestone that was interbedded with the black New Albany shale for a distance of several feet above the base of that formation. This fauna contained the species *Ambocoelia umbonata, Camarotoechia cf sappho, Camarotoechia sp., Chonetes cf. mucronatus, Coelospira sp., Gypidula cf. comis, Hypothyris cuboides?, Leiorhynchus quadricostatus, Leiorhynchus sp., Martinia subumbona, Spirifer tullius, Spirifer sp.,* and *Strophalosia sp.*

THE NEW ALBANY FAUNA

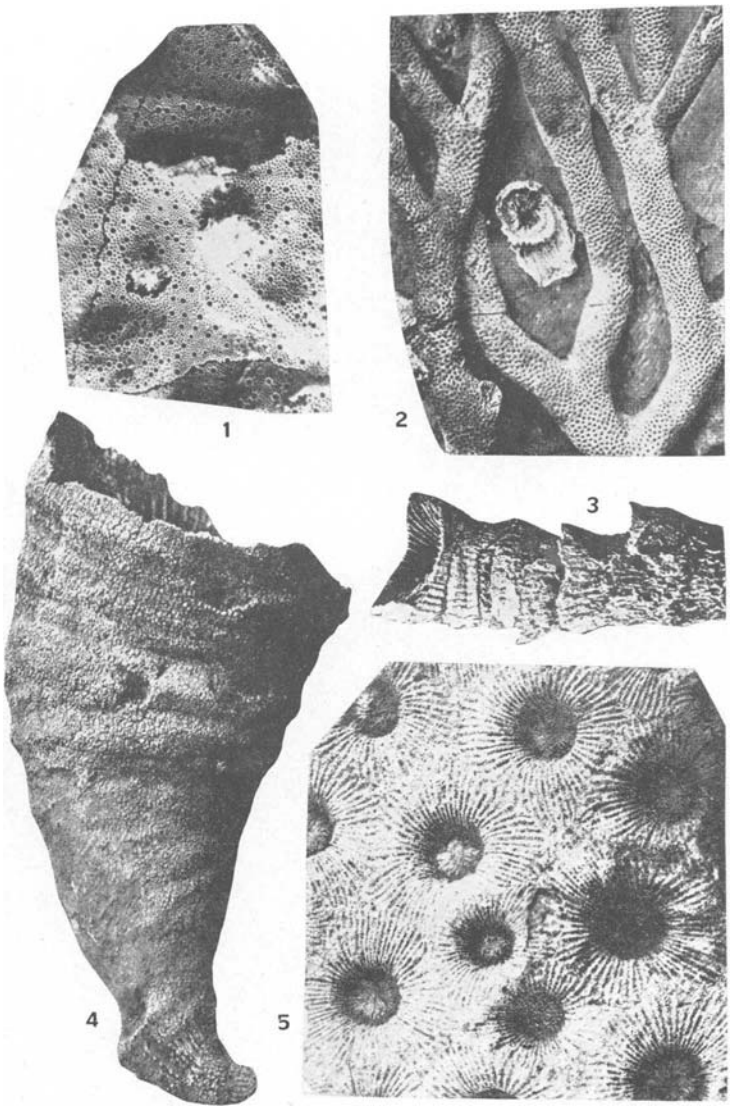
The New Albany fauna in Kentucky is mostly of Genesee age. It is most abundant in the lower part of the black shale, but in places several of the species continue a number of feet above the base, and may be found in some places near the top of this formation. The number of species in this fauna is not large, but in places the individual shells are very abundant. The following are the more common species in the New Albany shale: *Polygnathus cf. dubius, Prioniodus armatus, P. cf. radiatus, Leiorhynchus quadricostatus, Lingula ligea, L. spatulata, L. (Lingulipora) williamsana, Lingula sp., Orbiculoidea cf. minuta, Meristella cf. haskinsi, Roemerella cf. grandis, Schizobolus concentricus, Plethospira socialis, Straparollus sp.,* and *Styliola fissurella.*

Explanation of Plate XXVII

Figure

1. *Favosites canadensis* Billings. From the Jeffersonville limestone after Rominger.
2. *Cladopora bifurca* Davis. From the Jeffersonville limestone. After Davis.
3. *Blothrophyllum cinctutum* Davis. From the Jeffersonville limestone. After Davis.
4. *Zaphrentis prolifica* Billings. From the Jeffersonville limestone. After Davis.
5. *Phillipsastrea gigas* Billings. From the Jeffersonville limestone. After Davis.

PLATE XXVII



Fossils of the Jeffersonville Limestone—Devonian

Explanation of Plate XXVIII

Figure

1 & 8. *Elaeacrlnus (Nucleocrinus) verneuili* Troost. Jeffersonville limestone. After Grabau and Shimer.

2- 3. *Pentamerella pavilionensis* Hall. Jeffersonville limestone. After Nettelroth.

4. *Chonetes mucronatus* Hall. Jeffersonville and Sellersburg limestones. After Hall.

5- 6. *Camarotoechia tethys* Billings. Jeffersonville limestone. After Nettelroth.

7. *Atrypa reticularis* Linnaeus. Jeffersonville and Sellersburg limestones. After Nettelroth.

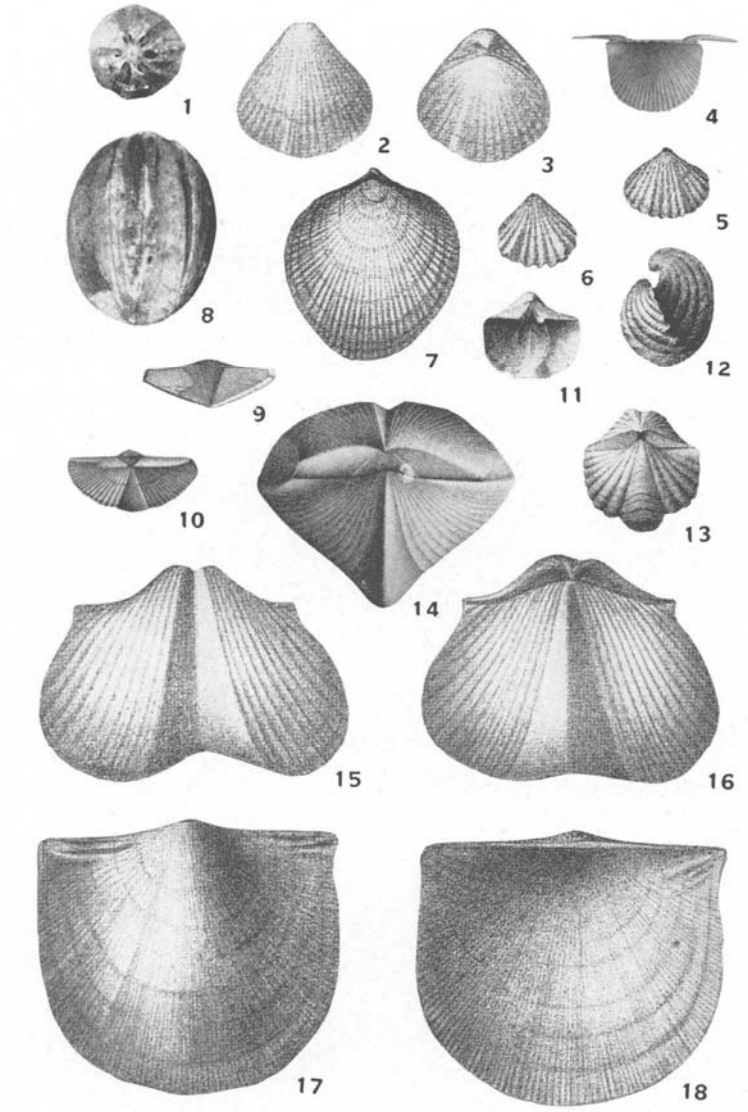
9-10. *Spirifer segmentum* Hall. Jeffersonville and Sellersburg limestones. After Hall

11-13. *Spirifer gregarius* Clapp. Jeffersonville limestone. After Hall.

14-16. *Spirifer acuminatus* Conrad. Jeffersonville limestone. 14 after Hall. 15 and 16 after Nettelroth.

17-18. *Stropheodonta hemispherica* Hall. Jeffersonville limestone. After Nettelroth.

PLATE XXVIII



Fossils of the Jeffersonville Limestone—Devonian

Explanation of Plate XXIX

Figure

1- 2. *Conocardium cuneus* Conrad. Jeffersonville limestone. After Nettelroth.

3. *Modiomorpha mytitoides* Conrad. Jeffersonville and Sellersburg limestones. After Hall.

4- 5. *Nucula niotica* Hall and Whitfield. Sellersburg limestone. After Nettelroth.

6. *Platyostoma lineata* var. callosa Hall. Sellersburg limestone. After Nettelroth.

7. *Nucula neda* Hall and Whitfield. Sellersburg limestone. After Nettelroth.

8 & 12. *Pleurotomaria sulcomarginata* Conrad. Jeffersonville limestone. After Nettelroth.

9-10. *Platyostoma lineata* Conrad. Sellersburg limestone. After Nettelroth.

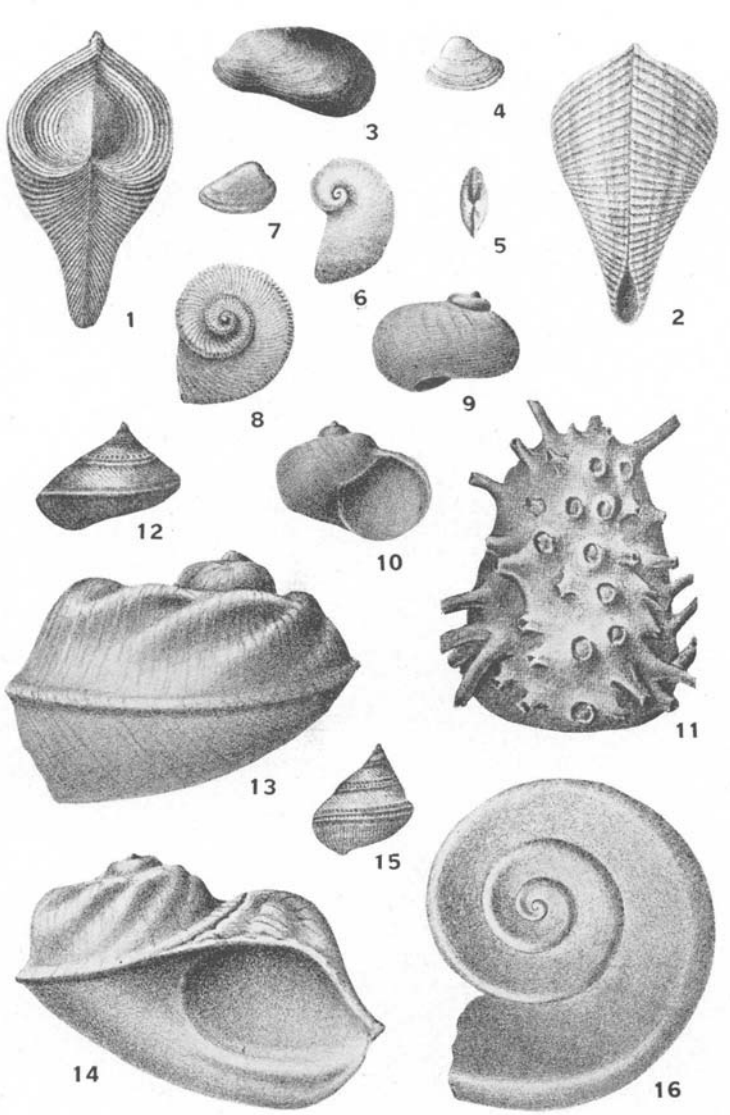
11. *Platyceras dumosum* Conrad. Jeffersonville and Sellersburg limestones. After Nettelroth.

13-14. *Turbo shumardi* Verneuil. Jeffersonville limestone. After Nettelroth.

15. *Pleurotomaria procteri* Nettelroth. Jeffersonville limestone. After Nettelroth.

16. *Pleuronotus decewi* Billings. Jeffersonville limestone. After Nettelroth.

PLATE XXIX



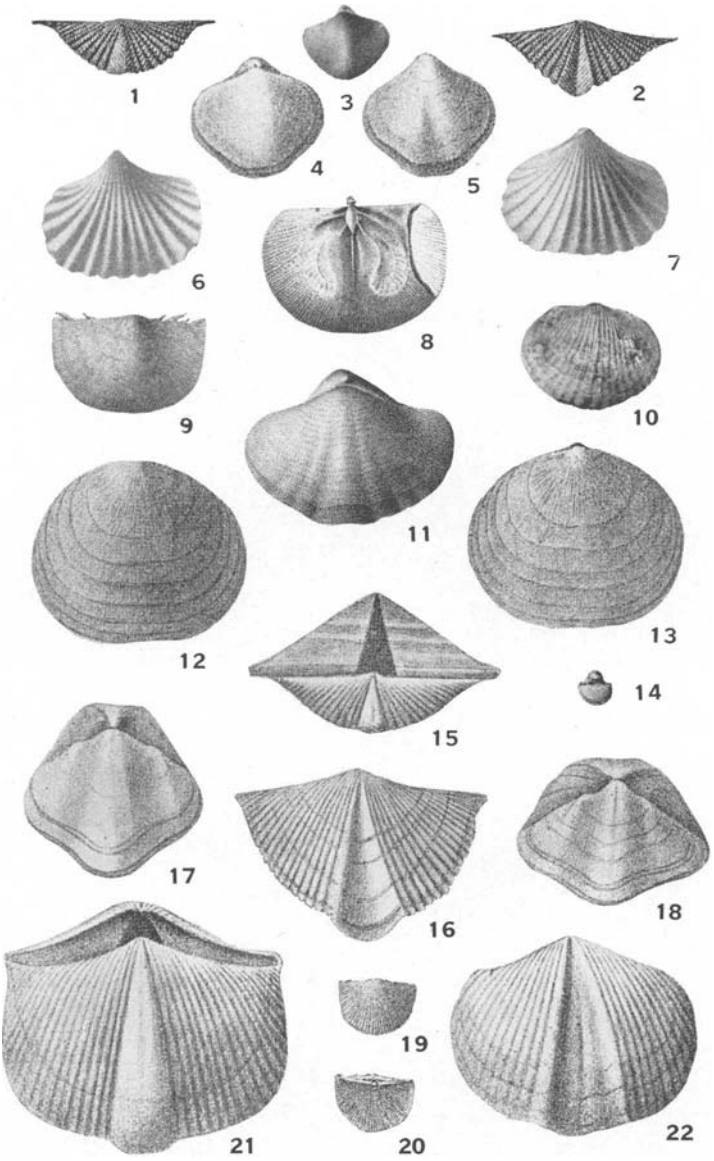
Fossils of the Sellersburg and Jeffersonville Limestone—Devonian

Explanation of Plate XXX

Figure

1- 2. *Spirifer hobbsi* Nettelroth. Sellersburg limestone. After Nettelroth.
3. *Trematospira hirsuta* Conrad. Sellersburg (Hamilton) limestone. After Hall.
4- 5. *Athyris vittata* Hall. Sellersburg limestone. After Nettelroth.
6- 7. *Camarotoechia sappho* Hall. Sellersburg limestone. After Hall.
8- 9. *Chonetes coronatus* Hall. Sellersburg limestone. After Hall.
10. *Tropidoleptus carinatus* Conrad. Sellersburg limestone.
11. *Reticularia fimbriata* Conrad. Sellersburg limestone. After Hall.
12-13. *Rhipidomella vanuxemi* Hall. Sellersburg limestone. After Nettelroth.
14. *Ambocoelia umbonata* Conrad. Sellersburg limestone. After Nettelroth.
15-16. *Spirifer fornacula* Hall. Sellersburg and Jeffersonville limestones. After Nettelroth.
17-18. *Pentagonia unisulcata* Conrad. Sellersburg limestone. After Nettelroth.
19-20. *Chonetes yandellanus* Hall. Sellersburg limestone. After Nettelroth.
21-22. *Spirifer granulosus* Hall. Sellersburg limestone. After Nettelroth.

PLATE XXX



Fossils of the Sellersburg Limestone—Devonian

Explanation of Plate XXXI

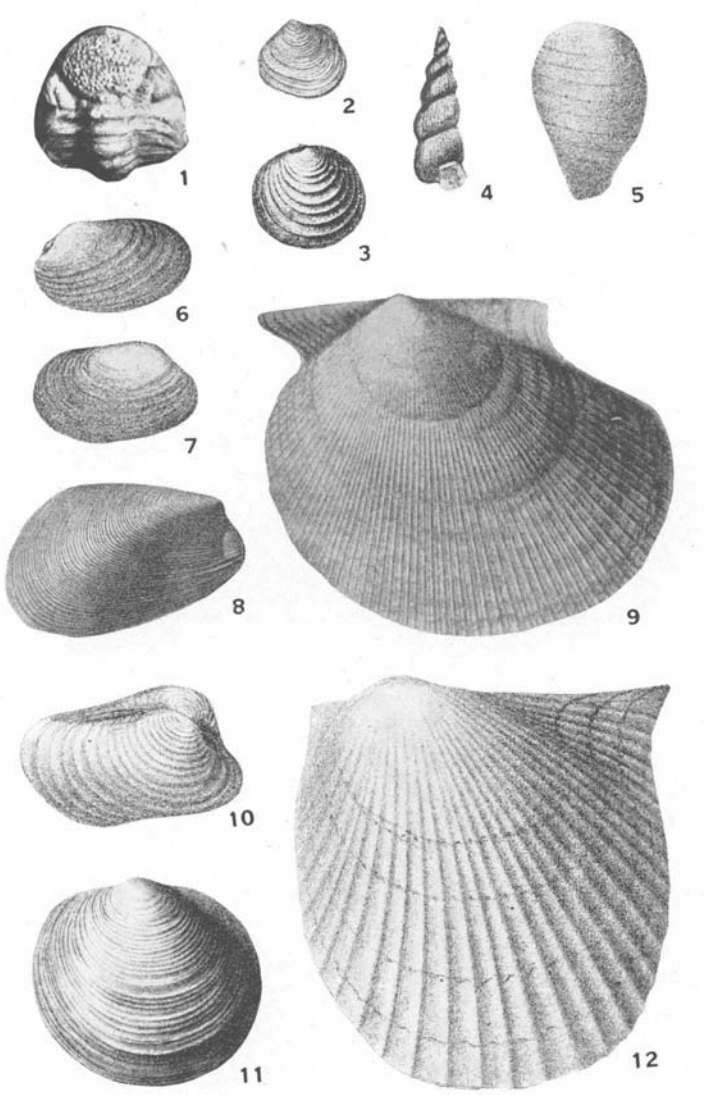
Figure

1. *Phacops rana* Green. Sellersburg limestone.
2. *Paracylas ohioensis* Meek. Sellersburg limestone. After Nettelroth.
3. *Paracyclas lirata* Conrad. Sellersburg limestone. After Hall.
4. *Loxonema hydraulicum* Hall and Whitfield. Sellersburg limestone. After Nettelroth.
5. *Gomphoceras turbiniforme* Meek and Worthen. Sellersburg limestone. After Nettelroth.

6- 7. *Clinopistha antiqua* Meek. Sellersburg limestone. After Nettelroth.

8. *Modiomorpha concentrica.* Conrad. Sellersburg limestone. After Hall.
9. *Aviculopecten princeps* Hall. Sellersburg limestone. After Hall.
10. *Grammysia gibbosa* Hall and Whitfield. Sellersburg limestone. After Nettelroth.
11. *Paracyclas elliptica* Hall. Sellersburg and Jeffersonville limestones After Hall.
12. *Glyptodesma cancellata* Nettelroth. Jeffersonville limestone. After Nettelroth.

PLATE XXXI



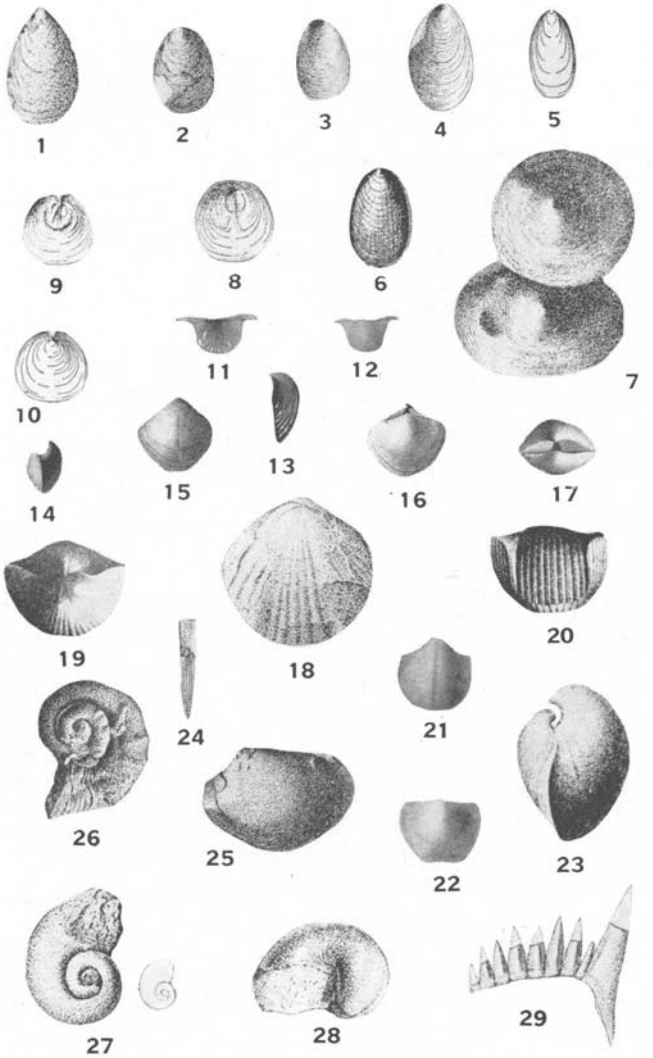
Fossils of the Sellersburg and Jeffersonville Limestone—Devonian

Explanation of Plate XXXII

Figure

1- 3 *Lingula (Lingulipora) williamsana* Girty. New Albany shale. After Girty.
4- 5. *Lingula spatulata* Vanuxem. New Albany shale. After Hall.
6. *Lingula ligea* Hall. New Albany shale After Hall.
7 *Roemerella grandis* Vanuxem. New Albany shale. After Hall.
8-10. *Schizobolus concentricus* Vanuxem. New Albany shale. After Grabau and Shimer.
11-13. *Chonetes mucronatus* Hall. Duffin bed. After Hall.
14-17. *Spirifer subumbona* Hall. Duffin bed. After Hall.
18. *Leiorhynchus quadricostatus* Vanuxem. Duffin bed. After Girty.
19-20. *Hypothyris cuboides* (Sowerby). Duffin bed. After Hall.
21-22. *Ambocoelia umbonata* Conrad. Duffin bed. After Md. Surv.
23. *Gypidula* cf. *comis* Owen. Duffin bed. After Hall.
24. *Styliola fissurella* Hall. New Albany shale. After Kindle.
25. *Paleoneilo* sp. New Albany shale. After Kindle.
26. *Straparollus* sp. New Albany shale. After Kindle.
27-28. *Plethospira socialis* Girty. New Albany shale. After Girty.
29. *Prioniodus* Sp.

PLATE XXXII



Fossils of the Duffin Limestone and New Albany Shale—Devonian