

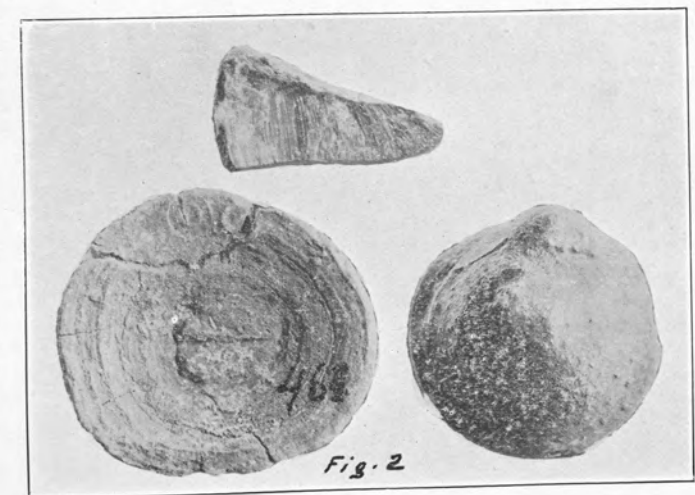
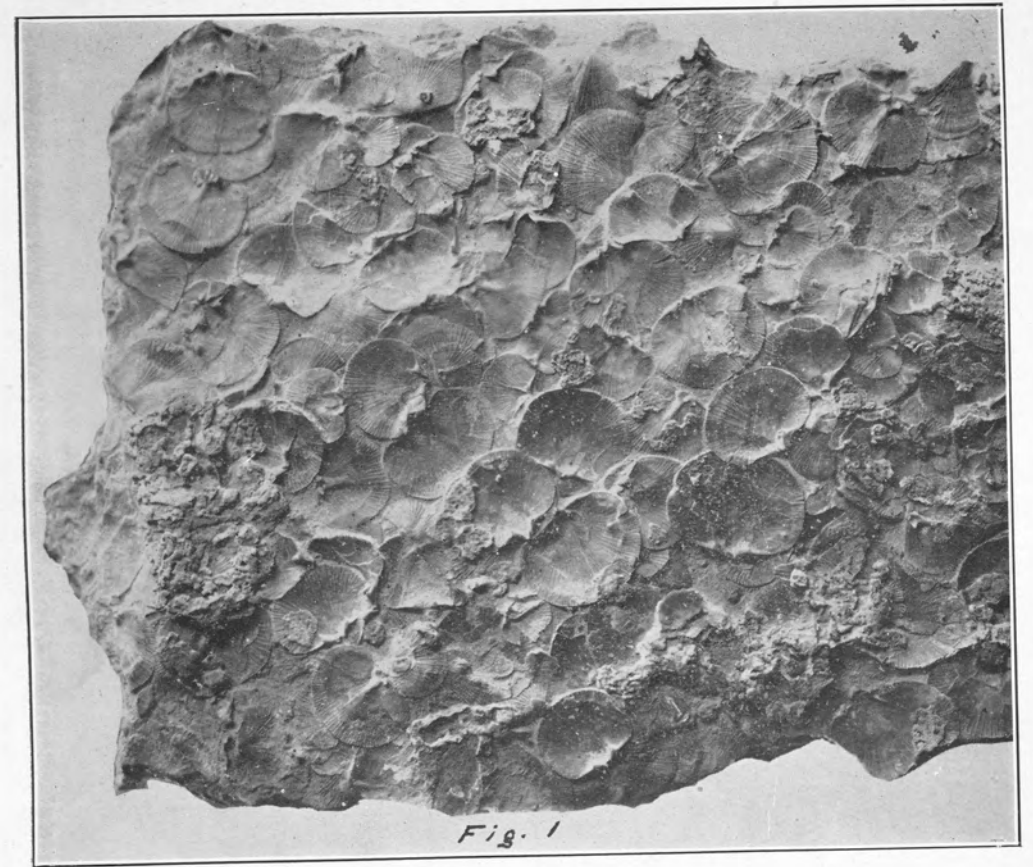


Plate V.

Characteristic Fossils of the Wilmore

Fig. 1. *Dalmanella bassleri* (Foerste.)

Fig. 2. *Prasopora simulatrix* (Ulrich.)

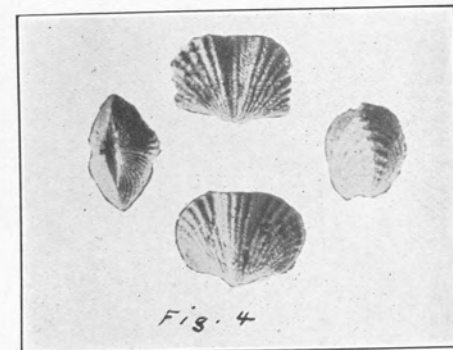
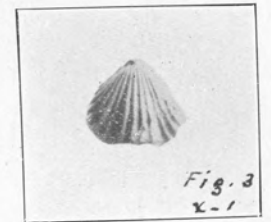
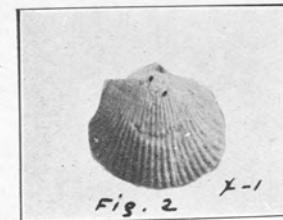
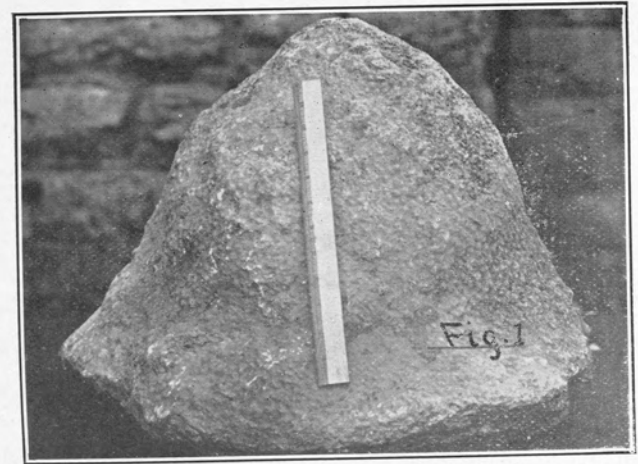


Plate VI.

- Characteristic Fossils of the Bigby.
- Fig. 1. *Stromatocentrum rugosum* (Hall.)
 - Fig. 2. *Hebertella frankfortensis* (Foerste.)
 - Fig. 3. *Rhyctotrema inaequivalve* (Cast.)
 - Fig. 4. *Platystrophia colbyensis* (Foerste.)

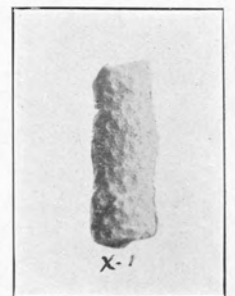
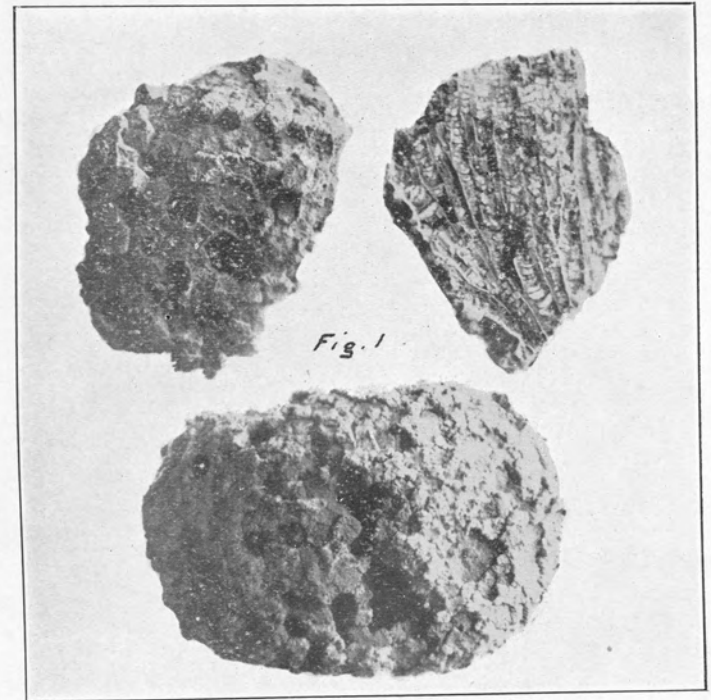


Plate VII.
Characteristic Fossils of the Woodburn.
Fig. 1. *Columnaria halli* (Nich.)
Fig. 2. *Constellaria teres* (Ul. and B.)

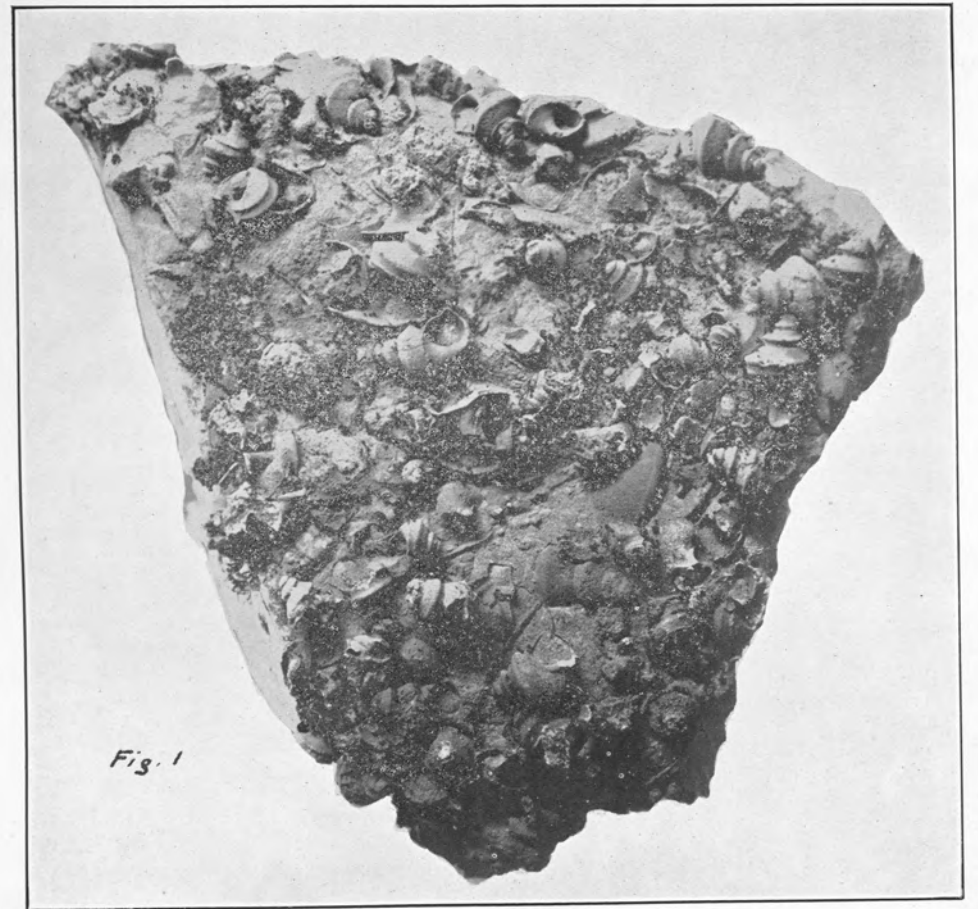


Fig. 1

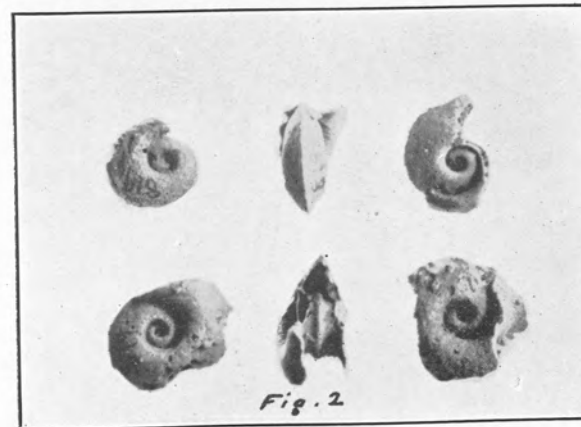


Fig. 2

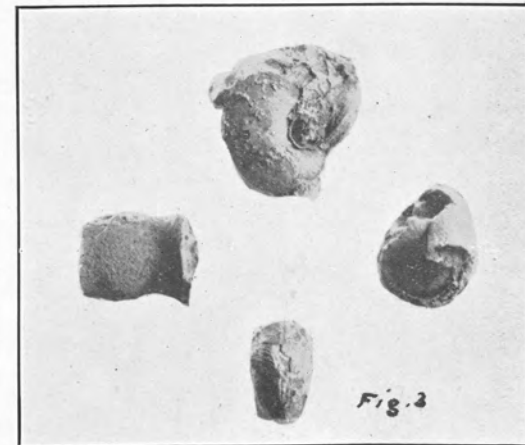


Fig. 3

Plate VIII.

- Characteristic Fossils of the Faulconer.
 Fig. 1. *Lophospira medialis* (U. and S.)
 Fig. 2. *Oxydiscus subacutus* (Ul.)
 Fig. 3. *Bellerophon troosti* (Saf.)

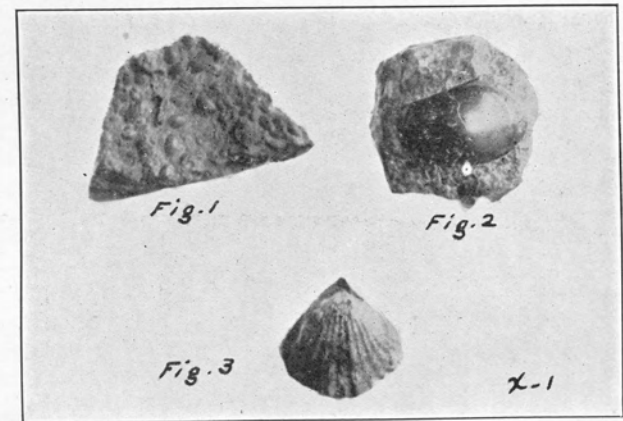


Plate IX.

- Characteristic Fossils of the Perryville.
Fig. 1. *Leperditia caecigena* (Miller.)
Fig. 2. *Isochilina jonesi* (Weth.)
Fig. 3. *Arthorhyncula linneyi* (James.)

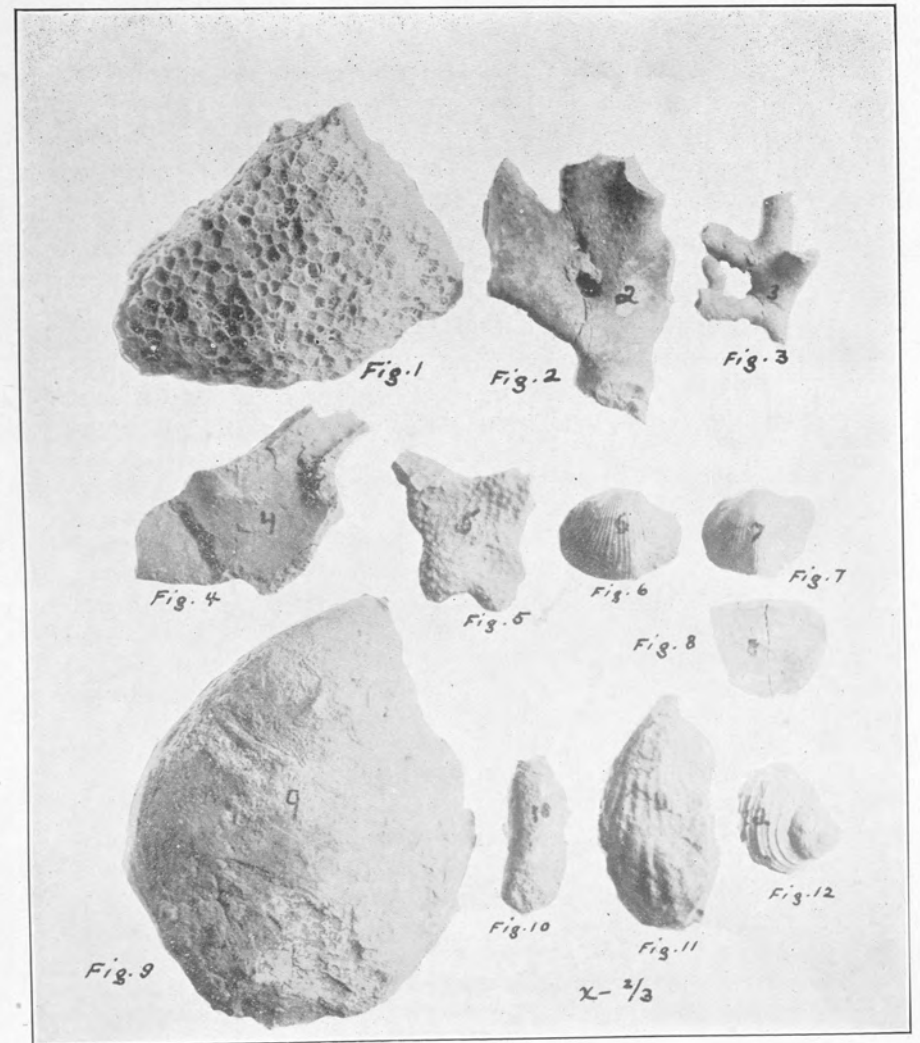


Plate X.

Characteristis Fossils of the Cynthiana

- Fig. 1. *Columnaria alveolata* (Goldfuss.)
- Fig. 2. *Heterotrypa parvulipora* (U. and P.)
- Fig. 3. *Eridotrypa briareus* (Nich.)
- Fig. 4. *Peronopora milleri* (Nickles.)
- Fig. 5. *Constellaria fischeri* (Ulrich).
- Fig. 6. *Hebertella sinuata* (Hall.)
- Fig. 7. *Hebertella maria* (Billings.)
- Fig. 8. *Rafinesquina alternata* (Emmons.)
- Fig. 9. *Allonychia flanaganensis* (Foerste.)
- Fig. 10. *Orthodesma* sp.?
- Fig. 11. *Byssonychia* sp.?
- Fig. 12. *Cyclonema varicosum* (Hall.)

THE IDENTIFICATION OF TRENTON AND LOWER GEOLOGICAL HORIZONS.

BY A. F. FOERSTE.

While the identification of geological horizons during field work is based largely upon lithological characteristics, nevertheless the more exact correlation of strata at different localities requires some knowledge of the contained fossils. There is not the slightest doubt that the prospector acquainted with the characteristic fossils, and their vertical and geographical distribution gains from this knowledge greatly in the facility with which he can trace strata. Owing to this fact, it is unfortunate that no detailed lists of the fossils characteristic of the various formations in the State are at hand. It is for the purpose of supplying this demand that the following lists are submitted. To these lists the following observations are added.

Stromatocerium, *Strophomena vicina* and *Dinorthis ulrichi*, associated with *Hebertella frankfortensis*, *Platystrophia colbiensis*, and *Rhynchotrema increbescens*, are characteristic of two horizons in Central Kentucky, the upper part of the Benson or Bigby and the Cornishville beds. Lithologically the rocks look very similar at the two horizons, and the means of distinguishing the latter is chiefly by examining the underlying and overlying strata. In the case of the Cornishville layer, the immediately underlying rock consists of a very fine-grained whitish or dove-colored limestone, not exceeding 7 feet in thickness, usually with few fossils but locally containing a few ostracoda; the overlying strata contain the very characteristic fauna belonging to the Catheys. In the case of the *Stromatocerium*, *Strophomena vicina* and *Dinorthis ulrichi* horizons at the top of the Benson or Bigby bed, the overlying strata consist not of the Catheys, but of the Brannon layer, from 40 to 70 feet of Trenton strata intervening before the Catheys is reached; moreover, beneath the horizons mentioned, instead of very fine-grained and very hard whitish or dove-colored limestone, there is a consider-

able thickness, often 20 to 30 feet, of coarse-grained limestone, below which there are finer grained limestones in which *Dalmanella* and *Prasopora* are more or less common.

From the preceding remarks it is evident that whenever the *Stromatocerium-Strophomena-Dinorthis* horizon is overlaid by a considerable thickness of strata containing *Hebertella frankfortensis* or *Rhynchotrema inaequivalve*, it must be the lower horizon that is exposed. It must be the lower horizon also if the overlying beds, some distance further up, so as to make allowance for the thickness of the Brannon bed, contain *Columnaria alveolata*, since the latter fossil is quite abundant locally at certain horizons in the Woodford bed.

In making these correlations by means of fossils the following facts should be observed. *Dinorthis ulrichi* and *Strophomena vicina* can be safely recognized by the beginner in the study of fossils only by looking for specimens exposing the muscular scars on the interior of the pedicel valves. There is no known reason why these fossils should not occur also at various levels in the Woodford bed, but judging from past experience they must be rare in the Woodford strata, if they occur there at all. *Hebertella frankfortensis* may be readily distinguished by its smaller size, the simple plications on its exterior surface, usually without the presence of intercalated plications, and the long hinge area. In *Platystrophia colbiensis* the plications are bolder, fewer in number, and there is a conspicuous elevation along the middle of one valve, and a corresponding depression along the middle of the other valve. From *Rhynchotrema* or *Orthorhynchula* it may be distinguished by the long hinge area. *Rhynchotrema increbescens* may be identified usually by means of its narrow, acute beak, there being no hinge area. It may be confused, however, with *Orthorhynchula linneyi*, which is a larger shell and has a small hinge area, usually not well exposed. Since *Orthorhynchula linneyi* occurs not only in the Perryville bed, locally, but also much more abundantly in the Catheys, it is important that the distinctions between *Orthorhynchula linneyi* and *Rhynchotrema increbescens* be carefully observed.

Columnaria is present also locally in the Catheys, but only as occasional specimens, and not in the abundance seen in the Woodburn division of the Trenton. It is the so-called honey-comb coral. A form of *Columnaria* occurs also in the Catheys, but it is quite rare and usually does not occur in masses more than two inches in diameter.

Stromatocerium occurs at so many horizons that the mere occurrence of a single specimen or two does not establish the geological horizon. Specimens occur not only in the upper part of the Benson bed and in the Cornishville layer, but also in the Catheys and at many other horizons. In the Trenton of Central Kentucky the specimens often attain large size. Most of them appear to be closely related to *Stromatocerium canadense* or belong to the variety described by Prof. W. A. Parks as *minimum*. The upper surface frequently presents a large number of rather low and wide elevations or mamelons which can be detected even in the case of specimens broken across so as to show the interior structure. This interior structure consists chiefly of numerous lamellae following each other in close succession and building up hemispherical masses often more than a foot in diameter. The thin vertical pillars uniting these lamellae often can not be detected readily, usually on account of failure of preservation during fossilization.

At the Brannon horizon, the bases of sponges belonging to the genus *Pattersonia*, are quite frequent. These resemble more or less twisted, thick but short strands or bundles formed of numerous long but very fine spicules.

The most important single work including many descriptions and illustrations of fossils belonging to the Trenton and Stones River formations in Central Kentucky, is Volume III of the Minnesota Geological Survey, which discusses the Paleontology of the Ordovician horizons not only of Minnesota and neighboring States, but also of Kentucky. Other descriptions and illustrations are scattered through many publications, including the Journal of the Cincinnati So-

ciety of Natural History, Volume VIII. of the Paleontology of New York, and the Bulletin of Denison University.

LISTS OF FOSSILS FOUND IN THE LOWER ORDOVICIAN FORMATIONS IN CENTRAL KENTUCKY.

Cornishville Division of Perryville Formation—

- Stromatocerium rugosum, Hall.
- Dinorthis ulrichi, Foerste.
- Hebertella frankfortensis, Foerste (borealis of some writers.)
- Platystrophia colbiensis, Foerste.
- Rhynchotrema increbescens, Hall (inaequivalve, of some writers.)
- Strophomena vicina, Foerste.

Salvisa Division of Perryville Formation—

- Isochilina jonesi, Wetherby.
- subnodosa, Ulrich.
- Leperditia appressa, Ulrich.
- linneyi, Ulrich.

Faulconer Division of Perryville Formation—

- Buthotrephis succulens, Hall.
- Cylindrocoelia danvillensis, Ulrich.
- Saccospongia danvillensis, Ulrich.
- Stromatocerium
- Tetradium columnare, Hall.
- fibratum, Safford.
- Prasopora.
- Rhinidictya neglecta, Ulrich.
- Clitambonites multistriata, Foerste.
- Dalmanella.
- Hebertella.
- Orthorhynchula linneyi, James.
- Rhynchotrema increbescens, Hall.
- procteri, Ulrich.
- Zygospira recurvirostris, Hall.
- Bellerophon bilineatus, Ulrich.
- troosti, Safford.
- troosti—burginensis, Ulrich.
- Bucania micronema, Ulrich.
- nana, Ulrich.
- nana-subspatula, Ulrich.
- rugatina, Ulrich.
- subangulata, Ulrich.
- sublata, Ulrich.
- Bucanopsis carinifera, Ulrich.

Faulconer Division of Perryville Formation—Continued.

- Carinaropsis cumulae, Hall.
- cymbula, Hall.
- Clathrospira conica, Ulrich.
- Cyclora minuta, Hall.
- parvula, Hall.
- Cyrtolites retrorsus, Ulrich.
- Eunema arctatum, Ulrich.
- obsoletum, Ulrich.
- Holopea parvula, Ulrich.
- Hormotoma salteri, Ulrich.
- salteri-nitida, Ulrich.
- Liospira micula, Hall.
- mundula, Ulrich.
- vitruvia, Billings.
- Lophospira decursa, Ulrich.
- elevata, var. Ulrich and Scofield.
- humilis, Ulrich.
- medialis, Ulrich and Scofield.
- medialis—burginensis, Ulrich.
- pulchella, Ulrich and Scofield.
- sumnerensis, Safford.
- Oxydiscus subacutus, Ulrich.
- Stenotheca unguiformis, Ulrich.
- Strophostylus textilis, Ulrich and Scofield.
- Trochonema subcrassum, Ulrich and Scofield.
- umbilicatum, Hall.
- Ctenodonta hartsvillensis, Safford.
- regia, Ulrich.
- retrorsa, Ulrich.
- Cyrtodonta grandis, Ulrich.
- grandis-germana, Ulrich.
- Lyrodesma intermedium, Ulrich.
- Matheria cf. tenera, Billings.
- Modiolodon patulus, Ulrich.
- Modiolopsis cf. nais, Billings.
- Vanuxemia hayniana, Safford.
- nana, Ulrich.
- Actinoceras milleri, Foerste.
- Halliella sculptilis, Ulrich.
- Leperditia caecigena—frankfortensis, Ulrich.
- tumidula, Ulrich.
- Conocardium cf. immaturum, Billings.
- Pterygometopus, Hall.

Woodburn Bed—

- Saccospongia danvillensis*, Ulrich.
- rudis*, Ulrich.
- Columnaria alveolata*, Goldfuss.
- Constellaria emaciata*, Ulrich.
- teres*, Ulrich and Bassler.
- Cyphotrypa frankfortensis*.
- Dekayella foliacea*, Ulrich and Bassler.
- Heterotrypa* cf. *parvulipora*, Ulrich.
- Mesotrypa echinata*, Ulrich and Bassler.
- Phylloporina granistriata*, Ulrich.
- reticulata*, Hall.
- Glyptocrinus* cf. *ramulosus*, Billings.
- Clitambonites* sp.
- Hebertella frankfortensis*, Foerste.
- Lingula procteri*, Ulrich.
- procteri*—*versaillesensis*, Foerste.
- Orbiculoidea lamellosa*, Hall.
- Platystrophia colbiensis*, Foerste.
- Rhynchotrema increbescens*, Hall.
- Triplisia* sp.
- Zygospira recurvirostris*, Hall.
- Bellerophon clausus*, Ulrich.
- Bucania frankfortensis*, Ulrich.
- Carinaropsis cymbula*, Hall.
- Clathrospira conica*, Ulrich and Scofield.
- Cyclora minuta*, Hall.
- parvula*, Hall.
- Cyrtolites retrorsus*, Ulrich.
- Liospira micula*, Hall.
- Lophospira bicincta*, Hall.
- decursa*, Ulrich.
- medialis*, Ulrich and Scofield.
- medialis*—*burginensis*, Ulrich and Scofield.
- obliqua*, Ulrich.
- pulchella*, Ulrich and Scofield.
- Microceras indornatus*, Hall.
- Colpomya constricta*, Ulrich.
- Proetus* sp.

Brannon Bed—

- Brachiospongia digitata*, Owen.
- Chirospongia wenti*, Miller.
- Pattersonia aurita*, Beecher.
- tuberosa*, Beecher.

Benson or Bigby Bed—

- Pattersonia*, basal spicule bundles.
- Stromatocerium rugosum*, Hall.
- canadense*—minimum, Parks.
- Cyphotrypa frankfortensis*, Ulrich and Bassler.
- Dekayella trentonensis*, Ulrich.
- Eridotrypa mutabilis*, Ulrich.
- Hallopora multitabulata*, Ulrich.
- Prasopora nodulosa*, Ulrich.
- simulatrix*, Ulrich.
- Dinorthis ulrichi*, Foerste.
- Hebertella frankfortensis*, Foerste.
- Platystrophia colbiensis*, Foerste.
- Rafinesquina alternata*.
- Rhynchotrema increbescens*, Hall.
- Strophomena vicina*, Foerste.
- Zygospira recurvirostris*, Hall.
- Cyclora Minuta*, Hall.
- Primitia nitida*, Ulrich.
- Proetus*.

Wilmore Bed—

- Hindia parva*, Ulrich.
- Solenopora compacta*, Billings.
- Atactoporella*.
- Cyphotrypa acervulosa*, Ulrich.
- Eridotrypa mutabilis*, Ulrich.
- trentonensis*, Nicholson.
- Eurydictya multipora*, Hall.
- Hallopora* (*Callopora*) *multitabulata*, Ulrich.
- (=kentuckiensis, James).
- Homotrypella granulifera*, Ulrich.
- mundula*, Ulrich.
- Mesotrypa angularis*, Ulrich and Bassler.
- Monticulipora arborea*, Ulrich.
- Pachdictya acuta*, Hall.
- Phacelopora constricta*, Ulrich.
- Prasopora falesi*, James.
- nodosa*, Ulrich.
- simulatrix*, Ulrich.
- Rhinidictya neglecta*, Ulrich.
- Dalmanella bassleri*, Foerste.
- Hebertella frankfortensis*, Foerste.
- Rafinesquina alternata*, Conrad.
- Rhynchotrema increbescens*, Hall.
- Schizocrania filosa*, Hall.
- Zygospira recurvirostris*, Hall.
- Conradella compressa*, Conrad.

Wilmore Bed—Continued.

- Cyrtolites retrorsus*, Ulrich.
- Fusispira angusta*, Ulrich and Scofield.
- angusta—subplana*, Ulrich and Scofield.
- subfusiformis*, Hall.
- Holopea appressa*, Ulrich and Scofield.
- Liospira mundula*, Ulrich.
- vitruvia*, Billings.
- Lophospira obesa*, Ulrich.
- Lyrodesma intermedium*, Ulrich.
- Ceratopsis intermedia*, Ulrich.
- Pterygometopus callicephalus*, Hall.

Logana or Hermitage Bed—

- Tetradium minus*, Safford.
- Mesotrypa quebecensis*, Ami.
- Prasopora hemispherica*, Ulrich.
- Dalmanella fertilis*, Ulrich.
- Heterorthis clytie*, Hall.
- Lingula coburgensis*, Billings.
- covingtonensis*, Hall and Whitfield.
- modesta*, Ulrich.
- riciniiformis*, Hall.
- Plectambonites*.
- Rafinesquina alternata*, Hall.
- Trematis ottawaensis*, Billings.
- punctostriata*, Hall.
- Archinacella simulatrix*, Ulrich and Scofield.
- Cyrtolites retrorsus*, Ulrich.
- Liospira micula*, Hall.
- Protowarthis pervoluta*, Ulrich and Scofield.
- Ctenodonta socialis*, Ulrich.
- Eurymya subplana*, Ulrich.
- Modiolodon oviformis*, Ulrich.
- oviformis—amplus*, Ulrich.
- Modiolopsis parva*, Ulrich.
- Ceratopsis intermedia*, Ulrich.
- Primitia*.
- Trinucleus concentricus*, Eaton.

Curdsville Bed—

- Receptaculites occidentalis*, Salter.
- Streptelasma profundum*, Conrad.
- Columnaria carterensis*, Safford.
- Aesiocystites priscus*, Miller and Gurley.
- Amygdalocystites florealis*, Billings.
- huntingtoni*, Wetherby.
- radiatus*, Billings.
- Apiocystites*.

Curdsville Bed—Continued.

- Astroporites ottawaensis*, Lambe.
- Ateleocystites*.
- Belemnocystites wetherbyi*, Miller and Gurley.
- Blastoidocrinus carcharidens*, Billings.
- Calceocrinus kentuckiensis*, Miller and Gurley.
- Carabocrinus ovalis*, Miller and Gurley.
- radiatus*, Billings.
- Castocrinus articulosis*, Billings.
- Cleiocrinus sculptus*, Springer.
- Comarocystites*.
- Cupulocrinus jewetti—kentuckiensis*, Springer.
- Dendrocrinus acutidactylus*, Billings.
- Edrioster bigsbyi*, Billings.
- Glyptocrinus mercerensis*, Miller and Gurley.
- priscus*, Billings.
- ramulosus*, Billings.
- Hybocrinus conicus*, Billings.
- tumidus*, Billings.
- Hybocystites eldonensis*, Parks.
- problematicus*, Wetherby.
- Palaeocrinus angulatus*, Billings.
- Pleurocystites mercerensis*, Miller and Gurley.
- cf. squamosus*, Billings.
- Porocrinus conicus*, Billings.
- kentuckiensis*, Miller and Gurley.
- Retiocrinus alveolatus*, Miller and Gurley.
- Homotrypa minnesotensis*, Ulrich.
- Dalmanella*.
- Dinorthis pectinella*, Emmons.
- Orthis tricenaria*, Conrad.
- Plectambonites curdsvillensis*, Foerste.
- Plectorthis plicatella*, Hall.
- Archinacella cingulata*, Ulrich.
- Bellerophon subglobulus*, Ulrich.
- Bucania elliptica*, Ulrich and Scofield.
- halli*, Ulrich and Scofield.
- Clathrospira subconica*, Hall.
- Conradella similis*, Ulrich.
- Gyronema pulchellum*, Ulrich and Scofield.
- Liospira angulata*, Ulrich.
- progne*, Billings.
- vitruvia*, Billings.
- Lophospira bicincta*, Hall.
- helictes—wisconsinensis*, Ulrich and Scofield.
- notabilis*, Ulrich.
- obliqua*, Ulrich and Scofield.

Curdsville Bed—Continued.

- oweni*, Ulrich and Scofield.
 - Omospira alexandra*, Billings.
 - Protowarthia cancellata*, Hall.
 - pervoluta*, Ulrich.
 - Raphistomina denticulata*, Ulrich.
 - Salpingostoma buella*—kentuckiensis, Ulrich.
 - Tetranota bidorsata*, Hall.
 - obsoleta*, Ulrich and Scofield.
 - Trochonema beachi*, Whitfield.
 - Conularia quadrata*, Walcott.
 - Ctenodonta subrotunda*, Ulrich.
 - Cyrtodonta, obesa*, Ulrich.
 - rotulata*, Ulrich.
 - subovata*, Ulrich.
 - Plethocardia umbonata*, Ulrich.
 - Vanuxemia cardinata*, Ulrich.
 - gibbosa*, Ulrich.
 - hayniana*, Safford.
 - umbonata*, Ulrich.
 - Colpoceras clarkei*, Wetherby.
 - Ormoceras tenuifilum*, Hall.
 - Orthoceras (Spyreceras) bilineatum*—frankfortensis, Foerste.
 - Triptoceras planoconvexum*, Hall.
- Tyrone or Lowville Bed—**
- Phytopsis tubulosa*, Hall.
 - Cylindrocoelia endoceroidea*, Ulrich.
 - Dermatostroma tyronensis*, Foerste.
 - Stromatocentrum rugosum*, Hall.
 - Columnaria halli*, Nicholson.
 - Streptelasma profundum*, Conrad.
 - Tetradium cellulosum*.
 - halysitiforme*.
 - Heterocrinus milleri*, Wetherby.
 - Escharopora angularis*, Ulrich.
 - Escharopora libana*, Safford.
 - ramosa*, Ulrich.
 - Helopora spiniformis*, Ulrich.
 - Homotrypa arbuscula*, Ulrich.
 - Orbignella wetherbyi*, Ulrich.
 - Phyllodictya frondosa*, Ulrich.
 - labyrinthica*, Hall.
 - Rhinidictya nicholsoni*, Ulrich.
 - Camarella panderi*, Billings.
 - Dalmanella hamburgensis*, Walcott.
 - Dalmanella subaequata*—circularis, Winchell.
 - Dinorthis deflecta*, Conrad.

Tyrone or Lowville Bed—Continued.

- Hallina saffordi*, Winchell and Schuchert.
- Orthis tricenaria*, Conrad.
- Rafinesquina minnesotensis*, Winchell.
- Strophomena incurvata*, Shepard.
- Zygospira recurvirostris*.
- Cyrtospira bicurvata*, Ulrich.
- Clathrospira subconica*, Hall.
- Eccyliopterus beloitensis*, Ulrich.
- Helicootoma granosa*, Ulrich.
- Hormotoma angustata*, Hall.
- Liospira abrupta*, Ulrich.
- angulata*, Ulrich.
- vitruvia*, Billings.
- Lophospira obliqua*, Ulrich.
- oweni*, Ulrich.
- perangulata*, Hall.
- serrulata*, Salter.
- Subulites nanus*, Ulrich.
- parvus*, Ulrich.
- regularis*, Ulrich.
- Tetranota bidorsata*, Hall.
- Trochonema ubilicatum*, Hall.
- Pterotheca attenuata*, Hall.
- Cameroceas*.
- Ormoceras tenuifilum*, Hall.
- Orthoceras tyronensis*, Foerste.
- Triptoceras planodorsatum*, Whitfield.
- Cyrtodonta huronensis*, Billings.
- subovata*, Ulrich.
- Drepanella crassinoda*, Ulrich.
- Eurychilina aequalis*, Ulrich.
- longula*, Ulrich.
- obesa*, Ulrich.
- Isochilina armata*, Walcott.
- Krausella arcuata*, Ulrich.
- Leperditia fabulites*, Conrad.
- Leperditella sulcata*, Ulrich.
- sulcata*—ventricornis, Ulrich.
- tumida*, Ulrich.
- Macronotella scofieldi*, Ulrich.
- Primitiella constricta*, Ulrich.
- Schmidtella near umbonata*, Ulrich.
- Tetradella quadrilirata*, Hall and Whitfield.
- simplex*, Ulrich.
- Bathyrus extans*, Hall.
- spiniger*, Hall.

Camp Nelson Bed—

- Mitoclema cinctosum*, Ulrich.
Dalmanella subaequata, Conrad.
Dinorthis deflecta, Conrad.
Hebertella bellarugosa, Conrad.
Orthis tricenaria, Conrad.
Protorhyncha australis, Foerste.
Rafinesquina minnesotensis, Winchell.
Rhynchotrema.
Strophomena incurvata, Shepard.
Ctenobolbina subcrassa, Ulrich.
Drepanella ampla, Ulrich.
 elongata, Ulrich.
 nitida, Ulrich.
Eurychilina aequalis, Ulrich,
 granosa, Ulrich.
Leperditella aequalatera, Ulrich.
 inflata, Ulrich.
 mundula, Ulrich.
Primitiella constricta, Ulrich.

A CHEMICAL STUDY OF THE TRENTON AND STONE'S RIVER ROCKS IN CENTRAL KENTUCKY.

By A. F. FOERSTE.

No chemical survey of the rocks of the state of Kentucky has ever been attempted. The writer, however, has had this long in mind, and, with the permission of the director, has collected samples from various localities with the idea of contributing toward such a survey. While the search for phosphatic deposits was in progress, a series of samples of Trenton and underlying strata was collected in Central Kentucky, not only with the idea of making a thorough search for phosphatic material at all horizons, but also for the purpose of contributing toward this general chemical survey.

It was believed that most of the earlier analyses having this object in view were misleading since they were based on chunks of rock, and not on a systematic collecting of chips representing every individual layer in its proper proportion throughout the entire rock mass being sampled. When it is learned that the collecting of three samples may occupy fully half a day, it may be easily understood why chunk collecting usually is allowed to pass under the name of sampling, although chunk collecting may give a very wrong impression as to the chemical characteristics of the general run of the rock.

HIGH BRIDGE.

The lowest strata in the state were studied at High Bridge. These include all the strata formerly included in the High Bridge or Stone's River group. Recently it has been learned that the upper division of this High Bridge limestone, the Tyrone, corresponds to the Leray of New York, and, as the latter has been included in the Black River of New York, it has been desirable to separate also the Tyrone of Kentucky from the High Bridge.