

upon which they sit perfectly motionless, in the manner of a thrush. If not farther disturbed they soon return to their search for food among the leaves. If greatly startled they take a long flight among the bushes and cannot be again found. Their only note was a single sharp chirp, uttered when surprised. They were all remarkably fat and were nearly all in immature plumage.

A letter from Dr. Brewer announcing the following donations to the museum from Mr. Harvey B. Bradley, was also read:—

Nest and eggs of *Dendroica castanea*, *D. coronata*, and *Ampelis carolinensis*. The nest of the first species is new to our collection, and is an acquisition of great value, having been found only once or twice before. The nest of *D. coronata* is also quite rare, and is interesting as coming from so southern a locality as Upton, Maine,

---

January 17, 1872.

The President in the chair. Seventeen persons present.

The following papers were read:—

THE NON-REVERSIONARY SERIES OF THE LIPAROCERATIDÆ,  
AND REMARKS UPON THE SERIES OF THE ALLIED FAMILY  
DACTYLOIDÆ. BY A. HYATT.

In my last communication to this Society I endeavored to trace the reversionary series of the Liparoceratidæ, and necessarily left out of consideration all those species which did not belong to one or the other of the truly reversionary series.

Of these last there is a very curious group, all the species of which, at a young stage, resemble more or less closely the young of the original type, *Microdoceras Birchii*, but betray by their development, adult characteristics and geological succession, a closer affinity to *Deroceras Dudressieri*.

This species in the communication referred to was shown to be the probable ancestor of a series of forms, which include *Deroceras confusum* and *Deroceras densinodum*. All of my observations, as well as those of Quenstedt, indicate that the true position of *Deroceras densinodum*, is between *Deroceras Dudressieri* and *Deroceras armatum*, and its geological relation is similar. It is found in the Raricostatusbed, just between the Obtususbed containing *Deroceras Dudressieri* and *Deroceras planicosta*, and the Armatusbed of the Middle Lias. My material, however, does not permit me to compare the young of *Deroceras armatum* and *Deroceras densinodum* in order to ascertain whether the former is really more closely allied to the latter than to *Deroceras Dudressieri*, but Quenstedt supplies this deficiency in the proof. According to his figure, this species is really an *armatus*, in which the young is pilated or ribbed at a very early period as in *Dudressieri*, instead of being smooth as in *armatus* proper.

The general tendency of the series, as shown by the adults and by the growth of individuals, is to produce the spines at wider intervals, depress or obliterate the pilæ, and by decreasing the breadth of the abdomen render the whorl more cylindrical. *Deroceras Davæi* carries this tendency still farther. The young being smoother, the spines more sparsely distributed, the fold-like pilæ almost absent in some specimens, and wholly superseded by the projecting lines of the transient mouths. These having previously been merely subordinate pilæ, have become primary and replaced the folds. It is not at all improbable that *Deroceras alternum*, from Plateau de Lazac, which appears to be very closely allied to *Deroceras Davæi*, may prove to be a local variety of the latter. However this may be, the young are more like those of *armatus* than are those of *Davæi*. *Deroceras minatum* is labelled by Dr. Krantz as a new species from the Upper Lias of the Plateau de Larzac. It differs in the form of the adult whorl and in the septa, though not in the young, from *Deroceras alternum* of the Middle Lias. The sides and abdomen are flattened instead of gibbous, as in the latter, and the shell is much flatter and thinner. The lobes are more deeply divided, and larger every way in *Deroceras alternum*, and the cells narrower at the neck, and spreading more at the base than in *Deroceras minatum*. In neither of these species are the specimens probably fully matured, but yet in one specimen of *Deroceras alternum*, only a half inch in diameter, the changes are fully as extensive, and the septa as completely developed as in the adult of *Davæi*.

The quadrangular form of the whorl and the tuberculated pilæ occasion in the young *Deroceras minatum*, during the later stages of growth, a resemblance to *Holandrei*, which subsequently changes to a nearer resemblance to *annulatum*.

Another series begins with *Deroceras muticum* of the Lower Lias, which appears in the Raricostatusbed, just above its nearest ally, *Deroceras Dudressieri*. This species is very much smaller than the last named, and differs in other respects; but it resembles it more closely than *Deroceras armatum*; whether it compares in the same manner with *Deroceras densinodum* or not, I am unable to decide. Its adult characteristics, however, and development, while they approximate to *Deroceras armatum*, do not permit of its association in the same series. The absence of intermediate pilæ, the constancy and closeness of the tuberculated pilæ and the septa are very distinct in this species, and the huge *Deroceras nodogigas* of the Middle Lias, which appears to form the second term in the same genetic series. Both of these series exhibit, so far as I can trace, no rever-sionary characteristics. Whether the modifications may be considered progressive or not, remains to be determined. There is the same tendency as exists in the other series of the family previously described to suppress the fold-like pilæ and prominent tubercles. It is noticeable that in the *armatus* series this takes the same direction as in the genetic series of the Dactyloidæ, which begins with *Dactylioceras commune* and ends with *Dactylioceras Braunianum*. The tendency in both of these groups is to obliterate the large tuberculated fold-like pilæ, with the minor ridges or pilæ gathered and joining in fascicles at the tubercles, and to substitute for this and the flattened abdomen a rounded whorl, single, sharply defined, entire pilæ. It must be remembered, also, that in neither of these series is there any increase of the involution in successive species. The umbilici are entirely open. The septa of *Deroceras Davæi* are rather more ornate and complicated than those of *Deroceras armatum*, and the lobes and cells of the latter than those of *Deroceras Dudressieri*. A certain amount of progress may perhaps be claimed for this series, but the other series, that of *Deroceras muticum*, is too incomplete. *Deroceras muticum* is certainly much smaller than its immediate ancestor, *Deroceras Dudressieri*, but on the other hand, *Deroceras nodogigas* is just as large. The septa, also, of the first named, which can hardly be said to be more complicated, cannot be claimed as simpler than those of *Deroceras Dudressieri*. The varieties of *Deroceras muticum*

indicate that there is a tendency existing in the organization to flatten the sides, and render them convergent instead of divergent. Whether this is a governing one or not in the series cannot be determined, and perhaps may never be, for it would not be at all surprising if these two species represented all that ever existed.

It is well to remember, however, that this is the same tendency which finds a fuller expression in the series made by *Dactylioceras commune*, *Holandrei*, *annulatum*, and *Braunianum*. It is here, however, only slightly shown, and the sides do not, in the most extreme variety, approximate, or become so convergent as to make the abdomen acute, as in *Dactylioceras Braunianum*.

The difference between the varieties of *Deroceras muticum* are however, comparable, so far as the divergency or convergency of the sides are concerned, to the difference between the divergent sides of *Cæloceras Desplacei*, and the convergent sides of *Dactylioceras Holandrei* or *annulatum*; species undoubtedly distinct and easily definable, on account of numerous other characteristics.

#### **Deroceras armatum.**

*Amm. armatus* Sow., Min. Conch., vol. 1, p. 215, pl. 85.

*Deroceras armatum* Hyatt, Bull. Mus. Comp. Zoology, no. 5, p. 95.

This species has, from the earliest period, a very marked character. It is smooth much longer than the young of *Deroceras Dudressieri*, or than any of the Liparoceratidæ, except *Microderoceras Birchii*. This species it resembles closely in form also, and in the acquisition of the spines. Thus the young *Birchii* have no pilæ, or only slight swellings or ridges, and in this species this condition is maintained throughout life. The whorl is crossed by numerous ridges between the spines, and three or more of these are often gathered into knots by the spines themselves, but no true pilæ, such as appear in the adult of *Microderoceras Birchii* appear. The sparseness of the spines and of pseudo-pilæ or ridges is also remarkable, especially as it is found in all of this species.

The septa closely resemble those of *Microderoceras Birchii*, — the large abdominal or siphonal cell in the centre of the abdominal lobe, with the adjoining superior lateral cells apparently stuck on to the side of the latter, — the height and extremely widespreading minor lobes, as well as the size of the superior lateral lobes, and the depth, narrowness and mode of division of the superior lateral cells by the very prominent minor lobes, — these decisive similarities, and the singularly close likeness of the very ornate outlines of all

the lobes and cells show that there can be no doubt of the affinity of this species for *Microderoceras Birchii*; but the single row of prominent spines indicates that, like *Deroceras Dudressieri*, it is a generic derivative from *Microderoceras Birchii*. And an examination of the young septa shows that at one stage they have the large cell in the centre of the superior lateral lobes so common in *Deroceras Dudressieri*. Thus the species is properly and more directly a descendant of *Deroceras Dudressieri* with reversions to *Microderoceras Birchii*. The absence of a planicostan abdomen at all stages places it in advance of *Deroceras Dudressieri*. The geological position of the latter in the Lower Lias Obtususbett, and of this species on the borders of the Middle Lias, confirm this view.

#### **Deroceras alternum.**

*Peronoceras alternum* Hyatt, Bull., *Op. cit.*, p. 85.

The young of this species is smooth, like the young of *Deroceras armatum*, the tubercles and pilæ are developed slowly, as in that species, and the characteristics of the adults are similar, with fold-like, spined pilæ, and numerous crenulations between. The abdominal cell is exceedingly large. The abdominal lobe is very broad, and much deeper than the superior lateral lobes. The superior lateral cells are extremely narrow, and much cut into by the minor lobes. The superior lateral lobes have three wide spreading branches and the intermediate cells therefore are very large, and the inferior lateral cells very much attenuated at the top. These characteristics approximate also to those of *Deroceras muticum*, though not so closely as to those of *Deroceras Davæi*, while the shell is more like *Deroceras armatum*. It possesses just the same intermediate character as *Deroceras Davæi*, but is a very much smaller species, with the young more like *Deroceras armatum*.

#### **Deroceras Davæi.**

*Amm. Davæi* Sow., Min. Conch., vol. iv, p. 71, pl. 350.

*Deroceras Davæi* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 84.

This species carries to excess the sparse distribution of the spines, the mere folds instead of pilæ, and the multitudinous crenulations observed in *Deroceras armatum*. The spines unite these when they occur in knots, but this is subject to the greatest variations, and the number of the spines varies considerably. They are not present in the young until a late period, and then occur pretty regularly, though much wider apart in some specimens than in others, and finally disappear suddenly as old age approaches. The advance of age is

indicated not only in this way, but by the irregularity of the crenulations. These, at intervals, are almost obliterated, and then grow gradually more prominent, again dropping suddenly to mere lines. Undoubtedly this indicates a failure of the vital powers, and a much slower growth of the shell. Longer and longer arrests of growth explain the increasing prominence of the crenulations, and a renewal of energy by means of these long rests may possibly explain the sudden smoothness; the animal affected by senility not being able to build and retain the crenulations, when the old rate of growth is suddenly resumed. The septa resemble closely those of *Deroceras muticum*. The superior lateral cells are, however, wider, the superior lateral lobes deeply divided, the inferior lateral cells very narrow. The abdominal lobe is deeper than the superior laterals.

Thus while more like *Deroceras muticum* than *Deroceras armatum* in its septa and in the external characteristics of the shell, still the folds, instead of pilæ at each spinous node, the spines and the crenulations between them, are characteristics uniting it with *Deroceras armatum*. The affinities therefore are doubtful, though in my opinion it is nearer to the latter than to the former, and is probably a species in the same series as *Deroceras armatum*.

#### **Deroceras muticum.**

*Peronoceras muticum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 85.

*Amm. muticus* D'Orb., Terr. Jurass., Ceph., pl. 80.

This species has two well marked varieties, one closely resembling *Deroceras Dudressieri* in the breadth of the abdomen and the divergency of the sides; the other peculiar, with flat, or slightly convergent sides. The pilæ and lower portion or base of the spines are not, as in *Deroceras Dudressieri*, filled with shell, and they are very distinct on the casts; nor do the young or adults even, so far as I have seen, exhibit the planicostan abdomen. The young, in other respects, are very similar to the young of that species, but the pilæ and the spines appear at an earlier age.

D'Orbigny's figure of the septa is excellent, and by comparison with those of *Deroceras Dudressieri* many constant differences can be observed, though the general characteristics are similar; the narrow, prominent, abdominal cell, the deep divisions, or minor three lobes at the bases of the superior lateral cells, the huge lateral cells on either side of the tops of the superior lateral lobes, and the extreme narrowness of the aperture at the top of the inferior lateral cells.

According to Oppel<sup>1</sup> this species is identical with part of *Amm. armatus densinodus* of Quenstedt, and is found in the *Raricostatus*-bed of the Lower Lias. This agrees admirably with its affinity for *Deroceras Dudressieri*, which occurs in the next bed but one below the *Obtusused*. Quenstedt (*Der Jura*, p. 105) also places this species with *raricostatus* in the Lower Lias. There are, however, a large number of specimens labelled "Venary près de Semur, Middle Lias," by Boucault, and these are associated with others which he has named "*subarmatus*," but which are merely the broad *Deroceras Dudressieri*-like variety described above.

### **Deroceras nodogigas.**

*Perenoceras nodogigas* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 85.

*Amm. nodogigas* Quenstedt, *der Jura*, p. 125, pl. 15.

The Museum possesses one large, but indifferently preserved specimen of this species, which does not enable me to throw much light upon its affinities. Quenstedt asserts that it is distinct from Oppel's *Amm. armatus*, which appears to be plainly enough indicated by this specimen. The pilæ and spines have none of the irregular swollen and divided aspect of those of the typical *armatus*, but are closely similar to those of *Deroceras muticum*. They are also more numerous than in *Deroceras armatum*.

## SERIES CYCLOCERATINÆ.

This series<sup>2</sup> exhibits some remarkably curious and interesting features. Like the *Dactyloidæ* it does not increase the involution of the whorls, but merely the flatness of the sides, the narrowness and prominence of the abdomen. The approximation of the earliest existing species, *Platyleuroceras brevispina* to *Microderoceras Birchii*, is very marked, and very curiously the adult is almost identical with the adult of *Microceras latæcosta*. From this species to the next but one, *Cycloceras Valdani*, is a considerable step. Not only has the character of the abdomen entirely changed from a rounded planicostan form to a keeled outline, but the young display this characteristic at an early age. The remaining species simply

<sup>1</sup> Die Jura formation. Jahrshefte für Naturk. in Würt., 1856, p. 209.

<sup>2</sup> This series was formerly described as a separate family in Bull. Mus. of Comp. Zoology, on account of the differences of the adults.

exaggerate these peculiarities. The geological succession does not strictly accord with the manner in which the organization of the species arranges them in the series.

*Platypleuróceras brevispina* occurs in the lowest bed of the Middle Lias, Jamesonbed, and *Cycloceras bipunctatus* and *Actæon* in the next, or Ibexbed; but *Cycloceras Masseanum*, instead of following these species, as would be naturally expected, is associated with *Platypleuróceras brevispina*. This discrepancy will probably be ultimately explained, but at present it must be quoted as an exception to the usual law of agreement between zoological rank as determined by development and geological succession in time. It is only fair, however, to state that the affinities of *Cycloceras Masseanum* were considered very doubtful before its geological position was ascertained.

#### PLATYPLEUROCERAS.

##### **Platypleuróceras brevispina.**

*Amm. brevispina* Sow., Min. Conch., vol. VI, p. 106, pl. 556.

*Amm. natrix* (rotundus et oblongus) Quenstedt, Die Ceph., p. 85, pl. 4, figs. 16, 17.

*Platypleuróceras latacosta* Hyatt, Bull. Mus. Comp. Zoology, no. V, p. 92.

*Cycloceras molare* Hyatt, Bull. Mus. Comp. Zoology, no. V, p. 92.

In this species we find a more singular combination of the characteristics of *Microderoceras* and *Microceras*. The young are for a lengthened period, until, in fact, they are over two inches in diameter, very similar to *Microderoceras Birchii*. Then the pilæ begin to stretch across the abdomen, forming a whorl closely identical externally with that of the adult of *Microceras latacosta*. The double line of tubercles is retained, however, much more persistently, and is usually more prominent than in the latter. The septa are very distinct at the same age in this species, the sutures being much more complicated, with more prominent cells and deeper lobes, and also as in *Microderoceras*, very deeply divided by three minor lobes. In the adult this contrast is not so great; the lobes and cells appear to spread considerably, and become more like those of the adult of *Microceras latacosta*.



## CYCLOCERAS.

**Cycloceras natrix.**

*Amm. natrix* Schlot. Petrefact.

*Amm. natrix* Ziet. Verst. Wurt., p. 5, pl. 4, fig. 5.

*Cycloceras natrix* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 92.

The adult alone was observed, and only fragments of the whorl, but these showed two lines of tubercles, single pilæ not stretching across the abdomen, the latter region elevated and keeled. *Amm. natrix* Ziet., according to Oppel, is the same as *Amm. brevispina* Sow., but the figure of the former has a distinct keel, whereas the latter has none.

**Cycloceras bipunctatus.**

*Amm. bipunctatus* Roem., Ool. p. 193.

*Amm. Valdani* D'Orb., Terr. Jurass., Ceph., p. 255, pl. 71

*Amm. compressus* Quenstedt, Die Ceph., p. 90, pl. 5, fig. 3.

*Amm. Valdani* Quenstedt, der Jura., p. 131, pl. 16, figs. 2, 3.

*Cycloceras Valdani* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 95.

*Amm. bipunctatus* Oppel, der Jura., p. 280.

The young of this species shows at an early age the keel and flattened whorl of the adult, thus showing no material difference either in development or adult characteristics from *Tropidoceras*, which genus is therefore suppressed.

**Cycloceras Actæon.**

*Amm. Actæon* D'Orb., Terr. Jurass., Ceph., p. 232, pl. 61, figs. 1-3.

*Tropidoceras Actæon* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 93.

This species is very closely allied to *Cycloceras bipunctatum*, and I much doubt the propriety of separating the two. The material at my command, however, does not permit me to examine the younger stages of *Cycloceras Valdani*, with the requisite fullness and accuracy.

**Cycloceras Ægæon.**

*Amm. Ægæon* D'Orb., Terr. Jurass., Ceph., p. 234, pl. 61, figs. 4-6.

*Tropidoceras Ægæon* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 93.

The progressive flattening of the sides and elevation of the abdomen reach a very advanced stage in this species.

**Cycloceras Masseanum.**

*Amm. Masseanus* D'Orb., Terr. Jurass., Ceph., p. 225, pl. 58.

*Amm. Masseanus* Quenstedt, Die Ceph., p. 90, pl. 5, fig. 2.

*Tropidoceras Masseanum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 93.

## SERIES PERONOCERINÆ.

This series has a development which connects it genetically with the Liparoceratidæ, but the adults possess the characteristic pilæ and general aspect of the family of Dactyloidæ. They combine the characteristics of both the Dactyloidæ and Liparoceratidæ without, however, being in any sense, so far as I can judge, transition types. The adults have the Dactyloidan characteristics, but these appear to be only mimetic. All the species of this last family, which are the real ancestors of the Perisphinctes group through *Cæloceras Pettos*, never repeat any of the characteristic features of *Peronoceras* in the course of their development, nor, on the other hand, do the young of *Peronoceras* show any genetic connection with either the young or the adults of the Dactyloidæ.

This series consists of *Peronoceras acanthopsis* and *subarmatum*, all of the Upper Lias, and found in the Posedonomyenbed. The horizon of *acanthopsis* is doubtful, but as this species is generally considered identical, and may really be a variety of *subarmatum*, it is probable that it is associated with the latter in the Posedonomyenbed. The adult of *acanthopsis* is similar, as shown in the specific description, to the young of *subarmatum*, which resembles it in the flatness and breadth of the abdomen, divergency of the sides, etc.

The young of *Peronoceras subarmatum* has, before the period at which it resembles *acanthopsis*, smooth, cylindrical whorls, then a period in which the highly divergent, tuberculated, but partly smooth sides remind one of *Deroceras muticum*. The slow increase of the whorls during the smooth period reminds the observer at once of the young *Deroceras armatum*, and the subsequent resemblance to the adult of *Deroceras muticum*, together with the near affinity of the septal outlines, appears to settle the question of derivation.

## PERONOCERAS.

**Peronoceras acanthopsis.**

*Amm. acanthopsis* D'Orb., Prod. d. Pal. Stratigraphique, p. 247.

*Deroceras acanthopsis* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 94.

One specimen of this species agreeing precisely with D'Orbigny's description, was found in Bronn's collection, labelled "*subarmatus*." It differs from this species, however, exactly as D'Orbigny de-

scribed. The abdomen is much broader, and the pilæ are much more numerous and closely crowded. They are gathered into knots at the spines from both the abdomen and the sides. At irregular intervals in the young a single pila will cross the abdomen between the spines, and this seems to become constant in the full grown shell. Whether it is to be considered a lower form of the series than *Peronoceras subarmatum* cannot be definitely decided. The adult is similar to the young of that species, but the young in our single specimen is wanting, and it cannot be decided therefore whether it is an arrested development of *Peronoceras subarmatum*, or simply an undeveloped lower form. The precise geological horizon is uncertain, Opper not mentioning the name at all.

**Peronoceras subarmatum.**

*Amm. subarmatus* Young & Bird, Geol. Yorkshire, p. 250, pl. 13, fig. 3.

*Amm. subarmatus* Sow, Min. Conch., vol. iv, p. 146, pl. 407.

*Amm. fibulatus* Sow., Min. Conch., vol. iv, p. 147, pl. 407, figs. 3, 4.

*Peronoceras subarmatum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 85.

The separation of the two forms *fibulatus* and *subarmatus*, seems to me unnatural, though Opper evidently considered them entirely distinct. His material was assuredly better than mine, but nevertheless I venture to think that in this case he erred. In the Museum collection there are nine specimens only, but nearly every specimen is distinct from every other, and if "*fibulatus*," or the flattened variety, is a distinct species, so are the others. The range also is here much less, both in form and characteristics, than between the variations of *Cæloceras Desplacei*. The young are either like *Peronoceras acanthopsis*, or they have exceedingly broad abdomens, divergent sides, pilæ similar, numerous whorls on account of the slow increase of the animal in thickness, or dorso-abdominally. The pilæ, however, are single in the young, and the tubercles do not gather them into knots though present at an early period. D'Orbigny quotes this species from the Middle Lias, but as shown, it occurs only in the Upper Lias.

DACTYLOIDÆ.

*Cæloceras pettos* appears to be the central form of this family; certainly its principal characteristics, the smooth, rotund abdomen, divergent and smooth sides, and single line of prominent lateral

tubercles along the edge of the abdomen, are repeated in the young, or during life in all the species which I have examined. There appear to be several series, but owing to the manner in which they have been found, to a great degree mixed or confused in the same formation, it is not possible to pick out the series so clearly. The evidence afforded by the geological succession of the species is wanting, and the observation made upon the zoological affinities cannot therefore be verified and corrected.

The first series may be considered somewhat doubtful.

*Cæloceras pettos* occurs in the Jamesonbed of the Middle Lias, and in the next bed, or Ibexbed, is found the only representative of the first series, *Cæloceras centaurus*. This species is referred with much doubt to the same genus, on account of certain resemblances of the young. If this position is the natural one for the species, it exhibits a degraded condition of *Cæloceras pettos*. The second series consists of *Cæloceras Desplacei*, and the specimens described under the head of *Cæloceras a* and *Cæloceras b*, from the Middle and Upper Lias. This series is closely connected in some of its characteristics with *Peronoceras*, such as the flat abdomen, and divided and tuberculated lateral pilæ of the young. On the other hand the untuberculated rotundity and single continuous pilæ of some varieties of *Cæloceras Desplacei* and *Cæloceras a* and *b* in the adults, render it somewhat similar to *Dactylioceras*. The next series, beginning with *Cæloceras pettos*, and having in it *Cæloceras mucronatum* and *crassum*, has septa with a narrow abdominal lobe; the cells and lobes are remarkably simple, generally bifid, and rather small. *Cæloceras crassum* has the young like *Cæloceras pettos*, but the sides become gibbous, and in some varieties finally flattened and parallel. In the next species, *Cæloceras mucronatum*, these stages are repeated in the young, and as the shell nears the adult period the sides become not only flattened and parallel, but convergent.

The next series consist of *Dactylioceras commune*, *Holandrei*, *annulatum* and *Braunianum*, all of the Upper Lias, Posidonomyenbed. In the young of *Dactylioceras commune* we find a smooth, slowly increasing whorl, which resembles the young of *Peronoceras subarmatum* at the same period. A distinct resemblance to *Cæloceras pettos* may be shown in the young, and was traceable in well preserved specimens, but in others the tubercles were not apparent. The principal features are closely representative of the adult of *Cæloceras mucronatum*, especially of the narrow abdomen and tuberculated, but

widely gaping pilæ of the abdomen. This is the pervading characteristic of the growth of the individual throughout the series, and is as strongly marked in the young of *Dactylioceras Braunianum* as in any of the other species. The adult whorls of *Dactylioceras commune* are rounded, those of *Holandrei* flattened on the sides; in *annulatum* with sides flattened and tendency of the abdomen to rise, or become somewhat subangular; in *Braunianum* all these changes are consummated in a very flat form of the whorls, and a subangular abdomen. The pilæ also cease to be divided on the abdomen in *Dactylioceras annulatum*; and in *Dactylioceras Braunianum* the abdominal area is smooth.

#### CŒLOCERAS.

##### *Cœloceras pettos*.

*Amm. pettos* Quenstedt, Flotz., p. 178.

*Amm. pettos* Quenstedt, der Jura, p. 135, pl. 16, fig. 14.

*Amm. crenatus* Zieten. Verst. Wurt., pl. 1, fig. 4.

*Amm. Grenouillouxii* D'Orb., Terr. Jurass., Ceph., pl. 96.

*Cœloceras pettos* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 87.

*Cœloceras Grenouillouxii* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 94.

In this species we find a remarkable form, flattened abdomino-dorsally; the sides very divergent, even in the adult, the abdomen rising with a gibbous curvature, and the involution reaching to the line of tubercles which ornament the outer edges of either side.

These may be either mere folds vanishing at a short distance from the tubercles, or well defined pilæ, passing almost entirely across the sides. There is as slight change made in the septa by growth as in the shell. At the earliest period examined, about the third whorl, the sutures had the full adult proportions. The abdominal and superior lateral lobes were of about the same height, the inferior laterals very small, but the top is on a level with that of the superior laterals. The superior lateral cells are much longer than the inferior lateral; the latter, however, are remarkably broad and low. Whether the extreme young had lobes and cells, and an external form like *Cœloceras centaurus*, I am not able to say, though they are similar to the adult of one variety of that species. The agreement of the name on several labels led me to quote *Grenouillouxii* independently, whereas it is evidently identical with *Cœloceras pettos*.

The specimens referred to, however, under this name, as quoted above in the synonymy, were not identical even with *Grenouillouxii*. They are from the upper Lias, and though very similar in many respects to *Cæloceras pettos*, really belong to *Cæloceras Desplacei*.

**Cæloceras centaurus.**

*Amm. centaurus* D'Orb., Terr. Jurass., Ceph., p. 266, pl. 76.

*Cæloceras centaurus* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 87.

The rounded and exceedingly gibbous sides, fold-like, but very prominent pilæ, and dorso-abdominally compressed whorl are peculiar, and markedly characteristic. The sides are not so flattened and divergent as in *Cæloceras pettos*, but rounded between the pilæ, and in certain specimens this rounding is excessive, and even the pilæ themselves are rounded off in conformity with the sides, and hardly elevated above them. In other specimens we have a form which in the young is precisely similar to this species, and then the sides begin to assume a great similarity to *Cæloceras pettos*. Instead of the depressions being very deep between the pilæ and those less wide apart and prominent, as in the typical *Cæloceras centaurus*, the former are shallow, and the latter close together and depressed. The pilæ are also tuberculated, as in *Cæloceras pettos*, and the whole of the side begins to assume the flattened convergent aspect of that species. The whorl, however, is not so depressed abdomino-dorsally as in that species, and the young are rounded as in *Cæloceras centaurus*, whereas the young of *Cæloceras pettos*, except at much younger stages, retain the typical adult characteristics of their own species. The septa of the young, on about the third whorl, alone were examined. This species had a broader and deeper first auxiliary cell, the superior and inferior laterals were equally divided in *Cæloceras pettos*, and trifold, or unequally divided, in this species. The inferior lateral lobes are not so deep apparently as in *Cæloceras pettos*, and the minor lobes and the whole outline more immature also, than at the same age in *Cæloceras pettos*. Its geological position above this species in the Ibexbed, first attracted my attention to the fact that it could not be considered an ancestor of *Cæloceras pettos*. The long duration of the smooth period in the young, the aspect of the pilæ and general form of the young whorl are very like the young of *Coroniceras Bucklandi* of the Lower Lias. A comparison, however, shows that its septa are more like those of *pettos* and the abdomen never possesses a keel. All the evidence in our possession thus fa-

vors the opinion that *centaurus* is a more or less degraded descendant of *Cæloceras pettos* or of some common ancestor.

### **Cæloceras Desplacei.**

*Amm. Desplacei* D'Orb., Terr. Jurass., Ceph., p. 334, pl. 107.

*Cæloceras Desplacei* Hyatt, Bull. Mus. Comp. Zoology, no. 5, p. 94.

The adults vary excessively, and the young also. They vary at all stages of growth, except the first few whorls which have sides invariably divergent. The sides may remain divergent with large spines, pilæ in knots, or may become flat or rounded, either with or without spines, or even flattened and convergent. Often without spines, the lateral pilæ single. The abdominal pilæ are always divided, but alternate with single pilæ, which cross the abdomen without interruption. Several specimens of this species, which were formerly referred in the Bulletin (No. v, p. 94) to *Cæloceras Grenouillouxii*, exhibit the characteristics of the young very fully. These are extremely broad, with very divergent sides. The spines are large tubercles, each uniting a couple of pilæ, or only perhaps thickening one. These occur sparsely, and between them are entire pilæ which may either split on the abdomen into two or three, which is the more common way, or run across unbroken. This is also characteristic of the adult. The youngest stages, however, with their almost smooth, highly divergent sides, and prominent tubercles on the edge of the abdomen gives very faithfully the prominent characteristics of the adult of *Cæloceras pettos*.

In other varieties of *Desplacei* not only are the adults devoid of tubercles on the cast, but this may extend to the extreme young. Generally speaking, however, at some time during the life of an individual, tubercles are present even on the casts. There may be some exceptions, but there are very few. When spines do not occur in the adults, as they do not, probably, on the shell itself sometimes, the sides are convergent, and they are conversely more prominent upon those shells which have divergent sides, like their own young, or the adult of *pettos*.

### **Cæloceras a.**

This species is considerably smaller than *Cæloceras pettos*. The young are, however, very like the young of that species for a long period, then the sides become parallel and drop their tubercles, then convergent. The pilæ on the abdomen at this time cease to be divided, and sweep across the abdomen and sides as in the last variety of *Cæloceras Desplacei*. During this period, also, the whorl de-

creases in breadth, so as to become perceptibly narrower than the next inner volution. Two specimens were examined, one from Middle Lias, Milhaud Coll. De Konnick, the other from Plateau de Larzac, Upper Lias. The septa hardly differ from those of the adult of *Cæloceras pettos*. A specimen of *Cæloceras crassum*, having the same contracted outer whorl, seems to show that these may be merely dwarfed varieties of *Cæloceras Desplacei*; the septa also show that the diminished end is not a body chamber, but part of a true whorl.

#### **Cæloceras b.**

This species from Plateau de Larzac appears to be different from all other forms. The young for a variable, but rather long period, probably five or six whorls, have the prominent tubercles, slight, lateral and divided abdominal pilæ of *Cæloceras pettos*. The form, also, of the whorls during this time is like that of the adult of *pettos*. On about the sixth or seventh whorl the tubercles disappear, and the pilæ, instead of splitting invariably at the abdominal border, often dichotomize on the side, as in the advanced age of certain varieties of *Cæloceras Desplacei*. At the same time several may be observed intermingled with these, which pass entirely around the whorl without division. In the course of a quarter of a volution the transition is completed, and all the pilæ have this character.

#### **Cæloceras crassum.**

*Amm. crassus* Phil. Geol. York., p. 12, fig. 15.

*Amm. raquinianus* D'Orb., Terr. Jurass., p. 332, pl. 106.

This species increases the abdomino-dorsal diameter faster, and is therefore a larger and stouter shell than *Cæloceras pettos*. The pilæ also on the sides, though still single, and each one bearing a tubercle, are more distinctly marked. On the abdomen two or three unite at each tubercle, and the intermediate spaces are occupied by single pilæ, which, however, do not extend on to the sides. In the adult the sides become parallel. They are at first divergent, then gibbous, and finally flattened and parallel.

#### **Cæloceras mucronatum.**

*Amm. mucronatus* D'Orb., Terr. Jurass., Ceph., pl. 104.

*Cæloceras mucronatum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 95.

The young of this species is like the adult of *pettos*, then as it increases in size resembles with great exactitude the adult of *Cæloceras crassum*, and finally the sides become parallel and flat, and begin to exhibit their own specially characteristic convergence. Some



individuals attain a diameter of one third of an inch before the sides become parallel.

#### DACTYLIOCERAS.

##### **Dactylioceras commune.**

*Amm. communis* Sow., Min. Conch., vol. v, p. 9, pl. 107, fig. 23.

*Amm. annularis* Zeit. Verst. Wurt., p. 14, pl. 10, fig. 10.

The adults of this species have a narrow abdomen and bifurcated pilæ similar to those of *Cæloceras mucronatum*. The pilæ are much closer set, and not tuberculated, and the sides and abdomen rounder. These same differences are very distinctly marked at a very early stage. The young are smooth, and resemble the adult of *pettos*. The lateral pilæ are single, and though tubercles are present in the young during the *pettos* stage, these disappear immediately. It is doubtful whether any of the adult pilæ are ever truly tuberculated. The young whorl is very broad in proportion to depth abdomino-dorsally, otherwise it closely resembles its own adult. The sides are not divergent but rounded, and the abdomen rising slightly. The increase is very slow to the adult, whose whorls are rounded and cylindrical.

##### **Dactylioceras Holandrei.**

*Amm. Holandrei* D'Orb., Terr. Jurass., Ceph., p. 330, pl. 105.

*Dactylioceras Holandrei* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 95.

This species is so closely allied to *Dactylioceras commune* that I can see no grounds for their separation, except that both D'Orbigny and Oppel have considered them as distinct. The history of the development and all other characteristics are the same, except the flattening of the sides of the adult in *Dactylioceras Holandrei*.

##### **Dactylioceras annulatum.**

*Amm. annulatus* Sow., Min. Conch., vol. III, p. 41, pl. 223.

*Amm. annulatus* D'Orb., Terr. Jurass., Ceph., p. 265, pl. 76.

*Dactylioceras annulatum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 95.

In some specimens of this species the young appear to have been smooth and tuberculated, as in *Dactylioceras Holandrei*, but in others the reverse occurs. The young resemble more decidedly, in the single instance examined by me, the adult of *Cæloceras Desplacei* than anything else. The lateral pilæ were bifurcated and coarsely tuberculated, as in that species. It resembles *Desplacei* in the in

crease of the single pilæ, which make their appearance between the bifurcated pilæ. The latter do in old age entirely give way to the bifurcated, and in some adults are very numerous. It should be mentioned that Opper found spines on the umbilical whorl of Sowerby's original, and the Museum specimen described above has one or two fine spines on what is probably the eighth whorl.

**Dactyloceras Braunianum.**

*Amm. Braunianus* D'Orb., Terr. Jurass., Ceph., p. 327, pl. 104.

*Dactyloceras Braunianum* Hyatt, Bull. Mus. Comp. Zoology, no. v, p. 95.

The cast of this species is particularly interesting. At or just before the adult stage the cast does not receive any impression from the abdominal pilæ, and looks smooth, narrow and subangular. The pilæ are prominent laterally, and have very slight tubercles. That the pilæ are continued on the exterior of the abdomen until a much later period than this, is very probable. The young of this species has, after the smooth stage, a period with tuberculated pilæ, during which the shell closely resembles the adult of *Cæloceras crasum*, having the same form and crenulations. Subsequently we see a repetition of the rounded sides of *Dactyloceras commune*, and as these flatten and the abdomen narrows, the whorls resemble those of *Dactyloceras annulatum*.

DESCRIPTIONS OF NEW SPECIES OF MARINE MOLLUSKS FROM  
THE COAST OF FLORIDA. BY ROBERT E. C. STEARNS.

**Marginella (Glabella) opalina** Stearns.

Shell ovate, solid; light to dark amber, some specimens showing obscure bands, more or less intense, of same color; subtransparent, smooth, polished; spire elevated, apex rounded; whorls four, suture distinct; aperture rather more than half the length of the shell; outer lip thickened, internally crenated, and strongly notched above; columella with four well developed plaits.

Largest specimen measured long. .21, lat. .1 inch;

Smallest do. do. long. .17, lat. .09 inch.

Habitat: Rocky Point, Tampa Bay, west coast of Florida, where several specimens were collected by Col. E. Jewett and myself; this beautiful little shell was found by us upon the under side of bunches of oyster shells, near low water mark. I know of no other species with which it might be confounded.