(3) Professor Kiuti makes the following remarks:

(a) It appears that the effect is rather large at weaker fields, so that it is possible that the shift is not quite proportional to the square of the field. However, the degree of accuracy of these measurements does not permit to assert it definitely.

(b) The weighted means of the most reliable observations is

Field	Shift
100,000 volt/cm	0.28 Å

(c) The field was here calculated theoretically. If Stark's value is extrapolated, the field becomes 5 per cent. less, increasing the shift in the same proportion.

In order to compare Professor Kiuti's measurements with our theory, it will be necessary to compute the theoretical shift more accurately than it has been done heretofore. The formula given in my paper (*l. c.*) for the shift is

$$\Delta_2\lambda = \frac{D^2\lambda^2}{16\mu^3 hc}\left(\frac{h}{2\pi e}\right)^6 [S(m, n, s) - S(m', n', s')],$$

$$(1)\quad S = (m+n+s)^4\,[17(m+n+s)^2 - 3(m-n)^2 - 9s^2 + 18s + 10].$$

D is the strength of field, m, n, s are quantic integers, while the rest of the symbols are used in the customary sense. Substituting the most accurate available values of μ, e, h, we find the numerical factor

$$(2)\qquad \Delta_2\lambda = 5.16 \cdot 10^{-18}\, D^2\lambda^2 (S - S'),$$

if D is expressed in kilovolt/cm, λ in Å.

The component observed by Professor Kiuti is in reality a superposition of two lines. The first is given by the quantic numbers $m=n=1$, $s=3$; $m'=n'=0$, $s'=2$, the second by $m=n=2$, $s=1$; $m'=n'=0$, $s'=2$. Accordingly, the first gives the shift 0.246 Å, the second 0.268 Å. The first line is responsible for 81 per cent. of the total intensity, while the share of the second is 19 per cent. We obtain, therefore, for the center of gravity the shift

$$\Delta_2\lambda = 0.251 \text{ Å}.$$

This is the theoretical value in the new theory which must be compared with 0.28 Å found by Professor Kiuti experimentally.

It is interesting to compute the values resulting from our old theory (*Ann. der Phys.*, 51, p. 168, 1916) with the same accuracy. The only difference is in the expression of the function S: the terms $18s + 10$ in formula (1) must be omitted. We obtain the following results: Shift of the first line 0.208 Å, shift of the second line 0.252 Å, shift of the center of gravity

$$\Delta_2\lambda = 0.217 \text{ Å}.$$

We see that the experiments agree decidedly better with the new theory than with the old one. Perhaps the accuracy of the observations is not yet sufficient to make the decision in favor of the new theory conclusive. It seems, however, that such a decision is well within the reach of experimental possibilities.

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UNUSUAL CARBONIFEROUS CEPHALOPODS

TEXT-BOOKS of geology point to the Ordovician as the time of great development of the straight cephalopods and declare that "these predaceous masters of the sea attained a length of twelve to fifteen feet, and had a maximum diameter of twelve inches." They further indicate that, with the rise of coiled forms, orthoceracones waned rapidly, although they were still common and relatively large in the Silurian, and not unknown in the Devonian. Carboniferous orthoconic cephalopods, however, are reputed to be rare and invariably small. That this is not always the case is evidenced by the discovery of large orthoconic forms in the Fayetteville shale of Arkansas, a formation of upper Mississippian (Chester) age. These fossils, which recently have been described in detail by the writer,[1] are remarkable for several reasons.

In the first place, they attained a length of at least four feet and must have had a diameter of ten inches. *R. solidiforme,* the holotype of the new genus *Rayonnoceras* (M. C. Z., No. 2326–30) has a diameter of six inches *posterior* to the living chamber, while another specimen, in the University of Arkansas Museum, has a diameter of nearly eight inches, *although the shell is still septate.* An ordinary collection of specimens of species of *Rayonnoceras* will contain individuals as large or larger than those in the usual Ordovician group of cephalopods. An examination of the literature shows that in only one other case have large straight cephalopods been discovered in the Carboniferous. Sowerby[2] described *Orthoceras gigantea* from the red limestone of Castle Espie, Ireland, as attaining a length of two feet. McCoy[3] later described the same species as *Actinoceras giganteum,* and reported its maximum (reconstructed) length as four feet. With the exception of this Irish species, no other Carboniferous cephalopod even approaches the Fayetteville specimens in size. There are also cases where orthoconic Carboniferous

[1] Croneis, C., *M. C. Z. Bull.*, LXVII, No. 10. (1926.)
[2] Sowerby, *Min. Conch.*, 81. (1818.)
[3] McCoy, *Carb. Fos. Ire.*, 11. (1844.)

forms of at least medium size are common. The Caney shale of the Arbuckle Mountains of Oklahoma, for instance, is often very fossiliferous, and in places carries a fauna made up predominately of straight cephalopods. It is evident that orthoceracones of large size and in large numbers did live on into the Carboniferous in a few favored localities.

The Fayetteville cephalopods are remarkable in the second place because of their unique morphology and because they are well enough preserved to throw definite light on their unusual structure. Polished sections show that the animal did not completely abandon its posterior chambers when the body moved forward to occupy a new "living chamber." Furthermore, it is evident that the camerae were not air containers, but the loci of deposition of regular organic deposits, secreted by rayonnettes, or double membranes, which extended from the siphuncular wall to the shell of the animal at about the middle of each camera. Complete evidence for this statement is presented elsewhere,[4] but partial proof for the contention may be found in the fact that the holotype of the genus *Rayonnoceras* is a conch which was broken in two and recemented during the life of the individual. If the cephalopod did not maintain organic connection with its camerae, this remarkable circumstance is very hard to explain.

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A PARASITE OF THE GOLD-FISH

A SHORT time ago Mr. Guy Mason, of Boulder, Colorado, sent me a parasitic crustacean which he had found on the gills of one of his gold-fish (*Carassius auratus*). It is broad oval, about 4.5 mm. long, with a pair of round adhesive discs on the under side. The tail is deeply notched, and is marked with a pair of black dots. The gold-fish was bought in Denver. The species proves to be *Argulus trilineatus* C. B. Wilson, well described and figured in Proc. U. S. Nat. Museum, XXVII (1904) p. 651. Wilson had a single female, found on a gold-fish at Macon, Georgia. My specimen is also a female. The name *A. trilineatus* is perhaps not quite appropriate, as my specimen shows the same pigment spots, but more numerous than in Wilson's figure and distributed along each side of a clear line. On each side of the line there is a certain tendency for the spots to be in two rows, and Wilson's figure apparently shows that his animal also had four rows of spots. The species presumably came from Europe, and it is in fact very similar to the European *Argulus coregoni* Thorell. Those who have gold-fish should be on the lookout for this curious crustacean which may prove to be commoner than the scanty records indicate.

Wilson writes *A. trilineata,* but the name *Argulus* is of masculine gender and is elsewhere so treated by Wilson himself.

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BOULDER, Nov. 18, 1926

[4] *Loc. cit.*, 345.

A CONTEMPORARY OF CHARLES DARWIN

A LETTER has recently been received from an English lady, Mrs. Arabella B. Fisher, who as Miss Arabella B. Buckley, at the age of twenty-three, served as secretary to Sir Charles Lyell. At that time Miss Buckley undoubtedly wrote many of the letters which passed between Lyell and Darwin.

The writer recently received a special request from Mrs. Fisher for a reprint of his address at Oxford entitled "The Problem of the Origin of Species as it appeared to Darwin in 1859 and as it appears to us to-day," as recently printed in SCIENCE. Mrs. Fisher's letter of acknowledgment shows that the Oxford address was successful in expressing almost complete dissent from Darwin's original statement without offending the old friends and supporters of the great naturalist:

> Thank you most heartily for sending me your article on "The Problem of the Origin of Species" at the request of Miss Allen.
>
> I am now an old woman 86 years of age, but I was a young girl of 23 when, as secretary to Sir Chas. Lyell, I first met Mr. Darwin and was encouraged by him to write on animal life for children. I had the privilege of visiting him and Mrs. Darwin at Down until his death in 1882.
>
> I revered him not only for his work but for his noble character, and was somewhat pained by the reaction against natural selection in the struggle for existence exhibited by some English and American zoologists after his death. As I married and lived in the depth of the country not long afterwards I only got second hand information as to recent advances in knowledge on these points.
>
> Therefore when I saw the short account in the *Times* of your address at the British Association this year I welcomed even such scanty information as it contained, and longed for the article itself.
>
> I give you these personal details as it will show you how I value your impartial account of recent investigation, and your appreciation of how the foundations of the theory itself were "really and truly laid" so far as the knowledge of that time permitted.
>
> Thanking you again most sincerely.
>
> Yours truly,
>
> (Signed) ARABELLA B. FISHER
> (née Buckley)