undergo rapid oxidation under the conditions of weathering on the land surface and the stony meteorites at a slower pace, if a meteorite of any type fell in a sea in which muds or limestones were accumulating, why should it not be buried in these sediments? We know that many of the minerals of the stony meteorites are similar to those of the terrestrial rocks and that the minerals of the latter may be buried without undergoing decomposition. We find arkosic rocks and graywackes (which contain minerals that under normal weathering conditions decompose entirely) that have been buried and constitute integral parts of sedimentary rocks.

An iron meteorite falling in sea water would be rapidly attacked (unless quickly buried) and the exterior converted into iron oxides which would protect the inner portion, in some degree at least, from complete alteration. Even if such a meteorite were completely altered to iron oxides, these should remain as a type of pseudomorph of the original meteorite. Unless the nickel which normally occurs in iron meteorites were all removed during the oxidation, its presence in the resulting ferruginous mass might be taken as evidence of the meteoritic origin of the mass. I have never found any material which suggested that it was of this origin or which seemed to merit being tested for nickel. It is equally difficult to believe that a stony meteorite, falling in a soft mud or calcareous ooze would not be buried before decomposition took place.

The presence of meteoric material in deep-sea muds has little real bearing on the question, as this material may be recent. It is in the possible occurrence of meteorites in the ancient sediments that I am interested. I will appreciate any information any one may have regarding this interesting quest.

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POSSIBLE RELATION OF AGE AT SEXUAL MATURITY IN BIRDS TO DAILY PERIOD, INTENSITY AND WAVE-LENGTH OF LIGHT

IN a recent paper, Riddle[1] shows that, in pigeons and doves, age at first sexual maturity is hastened if the bird reaches an age of 4 to 5 months between February 1 and July 31, and is delayed if this age is reached in autumn. The delay may reach 36 per cent. in pigeons and 52 per cent. in doves. This is brought about by endocrine conditions (thyroid and perhaps pituitary) connected with this part of the year. Earlier studies had shown that the season of accelerated sexual maturity is also the season when, even in mature birds, thyroid size and activity is decreasing. He found a seasonal factor in practically all aspects of sex and reproduction studied in doves and pigeons.

Rowan[2] shows that the seasonal changes of the gonads and occurrence of sexual maturity in the junco, with a single seasonal sexual cycle, is conditioned by length of daily period of illumination. He thinks the change of light period does not act *per se* but by prolonging or shortening the daily periods of muscular exercise. He has since come to the conclusion that this relation holds also for the crow in Alberta, Canada.[3] He altered the sexual cycle in the junco and crow by artificially lengthening or shortening the daily period of illumination for the birds. This is related to the changes of the sex glands and through them or with them to migration in these birds.

The writer[4,5] has reported the close relation of attainment of sexual maturity in the European starling in Hartford, Connecticut, (with single seasonal cycle) to the daily period of illumination, whether of natural or artificial light. This is not caused by changes of periods of muscular exercise in the starling as claimed for the junco by Rowan. However, increased periods of muscular work were found to prolong the refractory period before light-induced testis changes appear and perhaps to increase the rate of acceleration of changes once begun as the result of light change.

In a later study,[6] it is shown that light intensity is a factor in the induction of sexual maturity in the starling, when the periods of daily light are equal. Up to a certain light intensity, rate of acceleration of germ-cell activity, induced by added light treatments of equal duration, varies with the light intensity. Increase of daily period of illumination, even with low intensity of added electric light will induce sexual maturity in both first-year birds and those over a year old and sexually mature at least once before. This may be brought about even in midwinter at midwinter temperature. Sexual ma-

[1] O. Riddle, "Studies on the Physiology of Reproduction in Birds. XXIX. Season of Origin as a Determiner of Age at which Birds Become Sexually Mature." *Am. Jour. Physiol.*, 97 (4): 581–587, 1931.

[2] Wm. Rowan, "Experiments on Bird Migration. I. Manipulation of the Reproductive Cycle: Seasonal Histological Changes in the Gonads," *Proc. Boston Soc. Nat. Hist.*, 39: 151–208, 1931. See list there.

[3] Article in *New York Times*, July 21, 1931, "To Use 1,000 Crows in Evolution Tests, etc."

[4] T. H. Bissonnette, "Studies on the Sexual Cycle in Birds. I. Sexual Maturity, Its Modification and Possible Control in the European Starling (*Sturnus vulgaris*): a General Statement," *Am. Jour. Anat.*, 45: 289–305, 1930.

[5] T. H. Bissonnette, "Studies on the Sexual Cycle in Birds. IV. Experimental Modification of the Sexual Cycle in Males of the European Starling (*Sturnus vulgaris*) by Changes in the Daily Period of Illumination and of Muscular Work," *J. E. Z.*, 58: 281–319, 1931a.

[6] T. H. Bissonnette, "Studies on the Sexual Cycle in Birds. V. Effects of Light of Different Intensities upon the Testis Activity of the European Starling (*Sturnus vulgaris*)," *Phys. Zool.* in press, 1931b.

turity occurs in nature only in April, May and very early June.

In a further study,[7] it was found that the degree of effectiveness of the light and the character of its effect depend on the wave-length of the light used, when the luminous intensity is the same in artificial additions to daily sunlight period inside a room behind window glass. Red light, at relatively low intensity of illumination, induces sexual maturity in as short time as 23 days in midwinter, while green at the same intensity does not induce it at all, but inhibits it, in males at least. This occurs in juvenile birds of the previous summer's broods as well as in older birds.

It is known that spring sunshine is relatively rich in long red wave-lengths and poorer in the shorter wave-lengths of light, while summer and autumn sunlight is richer in shorter wave-lengths in comparison. So the same intensity of sunlight in spring is more stimulating to sexual maturity than in autumn or summer, for it contains relatively more of the stimulating red rays.

In view of all the above findings, it is suggested that Riddle's results point to a conditioning of the age at first sexual maturity in doves and pigeons, which have polyoestrous cycles, as well as in juncos, crows and starlings, with single yearly sexual activity, by the action of increasing or decreasing effectiveness of daily light periods. This effectiveness depends on length of period, intensity and wave-length of illumination per day. This may be affected by the above mentioned changes of the relative amounts of longer, stimulating rays and shorter, inhibitory wave-lengths of light incident to the season and height of the sun above the southern horizon. This is probably correlated with the endocrine functions of the thyroid and anterior pituitary glands as Riddle suggests.

The following scheme is suggested to describe the relation of age at first sexual maturity to the endocrine function and to the acceleration or delay of sexual development in birds on the basis of Riddle's, Rowan's and Bissonnette's experiments:

E = basal endocrine stimulus to sexual development of each race, or bird.
$-L$ = action of shortening days with decreasing intensity and less long-wave light.
$+L$ = action of lengthening days with increasing intensity and relatively more long-wave light.
R = Rate of development to sexual maturity in birds nearing the 4–5 month age at any time.
A = Age at first sexual maturity.
For July to January, $R = E - L$.
For February to June, $R = E + L$.

$$A = \frac{K}{R} = \frac{K}{E \pm L}$$

where K is a constant for the breed of bird. Birds mature early if they reach 4 to 5 months of age when $+L$ is effective, in February to June, and late if $-L$ is effective, in July to January.

It would be interesting to test the correctness of this suggestion by treating young doves or pigeons, of known breeding behavior, with various types of daily light period as has been done with the starlings. If it is valid, the age at maturity in these birds can be modified at will, irrespective of season.

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[7] T. H. Bissonnette, "Studies on the Sexual Cycle in Birds. VI. Effects of White, Green and Red Lights of Equal Luminous Intensity on the Testis Activity of the European Starling (*Sturnus vulgaris*)," *Physiol. Zool.*, in press, 1932.

"ENTAMOEBA" PHALLUSIAE

MACKINNON and Rae describe *"Entamoeba" phallusiae* in the June number of the *Journal of the Marine Biological Association* of the United Kingdom. This note is written merely to call attention to the slight doubt whether the form described is an *Entamoeba*. *Entamoeba* has a centronucleus (Boveri's very convenient term) containing a centrosome with a centriole, as have also many small amoebae, *e. g.*, most soil amoebae. From the figures and description of *"Entamoeba" phallusiae* one is in doubt as to the presence of an intranuclear centrosome, Fig. 3, A, B, and C suggesting, but not showing it.

The parasitic habit is not enough to determine that a species is an *Entamoeba* rather than an *Amoeba*, though it makes it probable that it is so. The chief distinction between the two genera is in the presence or absence of a centronucleus. Species of the true genus *Amoeba* have not been found to contain a centrosome, with centriole, in the nucleus. Many minute soil amoebae are morphologically *Entamoebae* and should be so recognized in spite of the absence of the parasitic habit. Habitat is hardly a proper determinative feature for generic diagnosis.

Amoeba, of course, is clearly a valid genus (See Mast and Johnson, Archiv f. Protistenkunde, 75, 1, 1931). Many so-called genera both of *Amoebae* and of forms with centronuclei when treated as subgenera give as good or a better idea of probable relationship.

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NATURALLY DEPOSITED EGGS OF THE MYXINOIDEA (HYPEROTRETIA)

EVER since J. Müller (1843) described the genital system of the myxinoids, many interested zoologists in Europe and America have attempted in vain to find the naturally deposited eggs of these eels. In