dwarf of *O. nanella* × *biennis* with the pollen of an ordinary *O. nanella* and got a culture of *O.* (*nanella* × *biennis*) × *nanella* = *O. nanella* which contained a high percentage of healthy plants. They began flowering when only 20 cm. high, the first flower appearing at a height of 10 cm.; whilst *O. Lamarckiana* reached 1.50 m. before flowering, the first flower opening about 80 cm. above the soil. All their leaves were as narrowly elliptical and as clearly stalked as those of the *Lamarckiana* itself, whilst the flowers were free from those abnormalities which usually accompany the dwarfish stature.

Thus we see that the discovery of Zeylstra, far from diminishing the value of *Œnothera nanella* as a real and (in an experimental way) most useful mutant, has given the means of cultivating it in as healthy a condition as may be required.

HUGO DE VRIES

BEHAVIOR OF SPERMATOZOA IN PLASMA

THE recent article of Loeb and Bancroft[1] and of De Meyer[2] in which their observations upon the behavior of spermatozoa in various sorts of solutions, such as extracts of eggs of the same species (De Meyer, eggs of *Echinus microtuberculatus;* Loeb and Bancroft, eggs of the common fowl), colloids, acids, alkalies, hypo- and hypertonic solutions, egg-albumen, blood serum and Ringer solutions are described open up a most interesting field for investigation. During the past summer while occupying a table at the Marine Biological Laboratory, Woods Hole (for the use of which I am indebted to Professor F. R. Lillie), I attempted to grow spermatozoa of *Arbacia punctulata, Mytilus edulis* and *Modiolus modiolus* in various solutions, some of which being listed above as used by these other workers.

[1] *Journ. Exp. Zoology,* 12: 381.

[2] *Arch. Biol.,* 1911, Bd. 26, H. 1, pp. 65–97: "Observations et expériences relatives a l'action exercée par des extraits d'œufs et d'autres substances sur les spermatozoïdes." I have seen only Robert Lewin's review in the *Zentralb. für Biochemie und Biophysik,* XII., No. 19/20, of De Meyer's paper.

On August 2, I centrifuged *Limulus* blood plasm and made a hanging drop from the upper layer, which examination showed to be free from cells; into this drop I introduced a few sperms from *Arbacia.* Great difficulty was experienced in attacks of bacteria and many of the preparations were discontinued the following morning. The slides were sealed with vaseline, as in the usual culture mount, and left at room temperature. By the eighth of August there was no movement in the sperms, although it had persisted up until that time and therefore the copper component of the blood of this animal does not seem to be toxic for *Arbacia* sperms, but none of the phenomena about to be described from mounts in different media were observed.

On August 5, a culture was made in the sterile agar medium, made according to the customary bacteriological formula, diluted so that it was liquid but highly viscid at 20° C. The spermatozoa lived only a short time and were seen to disintegrate within 24 hours. It may be stated that the reaction of the agar was estimated only roughly by an indicator and not titrated, so that I am not certain whether the medium was suitable from this standpoint. Care was taken to render the sea-urchins as free from bacteria as possible, the tests being washed off with $HgCl_2$, 1:1,000 before the cuts were made and sterile sea-water was used to receive the testes after extirpation. The mounts remained sterile throughout the time of observation, showing that the testes are bacteria-free, as one would suspect.

The plasma of a Norway rat was then tried on August 8 and this was prepared by centrifuging the blood of the rat in paraffin-lined tubes at about 8°–10° C. The plasma clotted when the hanging drop was made at room temperature, but sufficient time elapsed before the plasma clotted for the introduction of the sperm. The behavior of the sperm-heads was discovered to be quite like that described by Loeb and Bancroft for the sperm of the fowl, for the heads enlarged, became less dense, and distinct chromatin granules were visible, even in unstained preparations, resembling the nuclei of the spermatids of certain insects

which I have observed in a living condition without stains, the appearance being in this case checked with stained preparations. The sperms were active and the head and tail wriggled in their characteristic manner as long as they were visible. The tail became shorter and shorter as the head swelled, but in none of my specimens did the tail-cytoplasm completely incorporate itself into the head. This is true, I believe, for Loeb and Bancroft's experiments. In other words, a completely rounded out cell, like a spermatocyte, did not appear in these preparations.

De Meyer succeeded in causing the heads to swell by growing the sperms in a dilute solution of gelatin (gelatin *sol*); every indication pointed to the perfect imitation of the formation of the pronuclear condition in a normally fertilized egg. It is of the greatest interest, too, to observe that the experiments made by De Meyer in acid solutions gave exactly the same result as colloidal solutions in general—that is, a swelling in acid media.

These experiments and those of Loeb and Bancroft show the possibility of approaching the explanation of the behavior of the spermatozoon during fertilization upon physical-chemical grounds. Factors leading to mitosis should be determined and the various artificial parthenogenetic reagents should be tried.

I have recently determined, also, that if a trace of saponin be added to the water in which the spermatozoa of *Cerebratulus* lie, there is a slight cytolysis and swelling of the head of the spermatozoon, but the "tail" is not affected, apparently. Whether mitosis can be induced in this manner, as it can in the egg, in the formation of polar bodies, as I have elsewhere described, remains yet to be determined.[3]

MAX MORSE

TRINITY COLLEGE,
HARTFORD, CONN.,
April 10, 1912

[3] I am under obligation to the officers of the biological laboratories of Yale University, Professors Harrison, Coe, Woodruff and Petrunkevitch, for the opportunity to study living nemertean eggs and sperms.

SOCIETIES AND ACADEMIES

RESEARCH WORKERS IN EXPERIMENTAL BIOLOGY, WASHINGTON, D. C.

AT the meeting of this society, held on February 21, 1912, Dr. William N. Berg, of the Bureau of Animal Industry, gave a critical exposition of Zuntz's theory in regard to the physical-chemical basis of striated muscle contraction,[1] in which it was pointed out that this theory had many objectionable features. These may be summarized briefly as follows:

(*a*) Lymph contains practically no carbon dioxid in the gaseous state.

(*b*) Gases dissolved in water do not behave entirely like true solutes, and exert no osmotic pressure; exceptions are hydrochloric acid, ammonia and a few other gases.

Accordingly, the carbon dioxid produced by muscle contraction can not exert any osmotic pressure, and, furthermore, it is not shown in Zuntz's work that the walls of the muscle rods are impermeable to carbon dioxid during the contraction phase. This is necessary, for otherwise osmotic equilibrium could not be brought about by the inflow of water alone; an outflow of carbon dioxid must take place. A further objection is that carbon dioxid at the moment of its formation does not have a temperature of nearly 6000° C.

At the March meeting, held on the 20th inst., Dr. William Salant, chief of the pharmacological laboratory of the Bureau of Chemistry, gave a brief résumé of the caffein investigations which were conducted in the Department of Agriculture, and which embrace studies on the effects of different amounts of caffein upon the organism, with especial reference to the production of acute and chronic intoxication. Other factors, such as the influence of diet, age, season, etc., were considered.

In conjunction with the tests, which were done with carnivorous and herbivorous animals, the rate of demethylation of caffein and the elimination of caffein in the urine and gastro-intestinal canal were noted under normal and pathological conditions.

In addition to the above, the results of experiments upon the effect of caffein upon the circulation, with particular regard to synergism and the antagonism of other drugs, were reported.

LEWIS W. FETZER

[1] "Die Kraftleistung des Tierkorpers; eine Festrede," Kgl. Landw. Hochschule Berlin, 1908.