THE ATOMIC WEIGHTS—A QUARTER CENTURY'S PROGRESS.

IT may be of interest so near the close of the century to follow a good commercial precedent and make an inventory and strike a balance so as to gain some idea of the progress in chemistry. One portion of our stock in trade has caused us a great deal of trouble all through this century. It was introduced as a 'new line' at the beginning of the century and has been of the greatest value, but has suffered from serious fluctuations. The so-called chemical constants, namely, the atomic weights, which should be constants but have not been, have for the larger part of the century been in a humiliating condition of incertitude. But they are improving, settling down to their true values, as it were, and there is cause to take heart of hope concerning them.

Some thirty years ago the Periodic System was announced. The atomic weights had emerged from the slough into which they had sunk by the middle of the century, thanks to the labors of Cannizzaro, Williamson and others, but still there was very little unanimity except with regard to those for which the fewest data were in our possession. It is difficult to select for comparison any representative tables of atomic weights for these earlier years, as none were authoritative. In those days there were no national nor international committees to consider these matters. We shall not go far wrong, however, if we take the list used by Mendeléeff in the construction of his first table and that given by Fownes, whose text-book was very largely used in England and in this country. For the later comparison we will make use of the tables given by the American and German committees. Sixty-three elements come under the comparison in the former case and seventy in the latter. The comparative table follows:

COMPARISON OF LISTS OF ATOMIC WEIGHTS.

	Mendeléeff and Fownes.	American and German.
No. atomic weights differing by less than 0.1	35	46
" " " " " " " 0.1 and less than 0.2	4	9
" " " " " " " 0.2 " more than 0.5	6	11
" " " " " " " 0.5 " " " 1	4	4
" " " " " " " 1 " " " 2	4	..
" " " " " " " 2 " " " 5	5	..
" " " " " " " 5 " " " 10	2	..
" " " " " " " 10 " " " ..	3	..

While much is left to be desired, the improvement is most gratifying. In the earlier tables 55.5 per cent agreed within 0.1 of the value. The majority of these as given in the table were whole numbers and were simply rounded off because the fractions were unknown. The tables of 1899 give 65.7 per cent. of all the elements as agreeing to the same extent, and here the most scrupulous care has been observed in recording the fractional portions. Nearly eighty per cent. of the atomic weights used at present vary by 0.2 or less where in the earlier tables this proportion was only sixty-two per cent. Nearly thirty per cent. of the earlier atomic weights varied by 0.5 or more where only five per cent vary now. None of the present atomic weights vary by more than one whole number where fourteen varied a quarter of a century ago, five of these varying by more than five integers. It is evident that the list is narrowing down and that this blot of ignorance and inaccuracy which has rested upon the science will soon be removed. Few realize how great the army of workers along this line

has been and how much work has been accomplished. About one hundred and fifty new determinations of atomic weights have been made in the last twenty years. Still a great deal more work remains to be done.

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HERMAPHRODITISM IN OSTREA LURIDA.

While doing some work for the United States Fish Commission, during the summers of 1897 and 1898, to determine the possibility of propagating Eastern oysters on the Oregon coast, I had an excellent opportunity to study the question of the sex of this West coast oyster. To the best of my knowledge, this question has never been approached hitherto.

During the spawning season of 1897 individuals emitting sexual products which

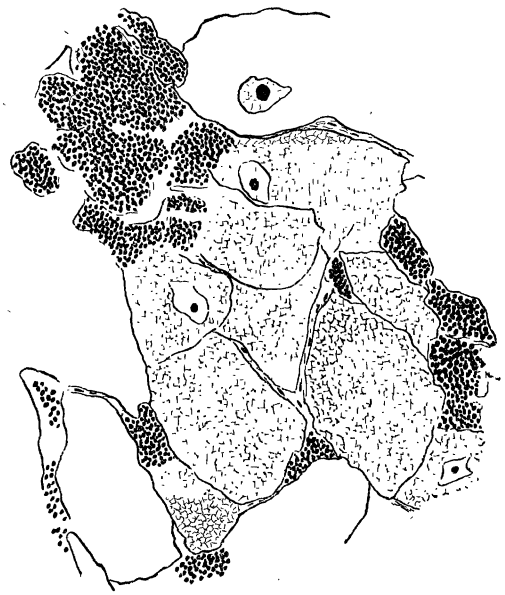

Fig. 1.

proved under a magnifier to be in some cases sperm and in other cases eggs were carefully labelled and separately preserved in different media. As in *Ostrea Virginica*, there is no possibility of mistaking the identity of these sexual products obtained from the visceral mass; even with the naked eye the granular appearance of the eggs is distinct and pronounced, and the thick, creamy consistency of the non-granular male fluid can never be confounded with them.

In my notes for 1897 there is no mention of finding ova mingled with spermatozoa in the examination of living products with the microscope. But, after staining and sectioning a number of individuals, *all of which are labelled males, I almost invariably found ova in the generative follicles*, and amongst them I observed small, deeply-stained bodies in dense masses, which I was led to conclude, even on a preliminary examination, were masses of spermatozoa (see Fig. 1, *Camera lucida* drawing B. & L., O_c 1. Obj. $\frac{1}{6}$). This belief was strengthened on using a $\frac{1}{12}$ hom. imm., by which I could see occasional faint projections from the small bodies referred to, which projections I assumed to be the tails of the spermatozoa, the dots representing the nucleated heads. The finding of ova in these sections was, of itself, startling, for when alive and tested for sex they gave unmistakable evidence of being males. In the figure, which only represents a portion of one generative follicle, four of the ova show germinal vesicles.

This season I gave more particular attention to the microscopic examination of living specimens. The seemingly conclusive results from the study of many individuals is here given. In a specimen of fluid from a male I observed, among free spermatozoa covering the field, collections of sperm cells which I will call 'sperm masses.' Each sperm cell in a mass possessed a tail, and these tails, actively waving to and fro in the salt water under the cover slip, caused the mass to move about. These tails were seen fairly well with a $\frac{1}{6}$ obj. These living sperm masses I regard as identical with the deeply-stained masses seen among the ova