the good ones in hearing, those in the senses of pressure and temperature, the accurate measurements of visual space, the measurements of the reaction-time, etc., have all tended to place experimental psychology on a high level and to furnish a foundation for a science of psychical measurements, or psychometry.

What is the reason, then, that we are doing second-rate work when we might do first? The trouble lies, it seems to me, in the lack of a proper training. We attempt to make experiments; but how many of us have received a practical training in the use of our apparatus? We make observations; but how many are familiar with the methods of observation and the computation of errors? We obtain tables of results; but how many know how to formulate the equation expressing those results? I know that, until I was brought face to face with the question of what to do with my figures when I had got them, it had not occurred to me to remedy my deficient training by a study of the methods of expressing results. We all of us daily use light, sound, heat, electricity, etc., in our experiments; but how many are familiar with the units and the methods of measuring these forms of energy? What a psychologist must have is a thorough course of training in psychometry, or the methods of psychical measurement.

Summing up, I would say that what we need in experimental psychology is: no quackery, little amateurism, a proper estimation of qualitative work as subordinate, a transformation of the qualitative into quantitative investigations, and, as the means of obtaining all this, a thorough laboratory training. E. W. SCRIPTURE.

Clark University, Worcester, Mass.

THE VESICLES OF SAVI.

IN the *Archives Italiennes de Biologie*, XVI., 1891, page 216, there is a reprint from the *Atti della R. Accad. dei Lincei*, VII., 1891, fasc. 6, of Dr. Alessandro Coggi's important notice of the development of Savi's "*appareil folliculaire nerveux*" in the torpedoes. Since Savi's announcement of his discovery of these peculiar follicles on the lower surface of the torpedo, 1841–44, an extensive series of publications has been made on the subject. The anatomy has received attention at the hands of Boll, Leydig, Kölliker, Max Schultze, Müller, and others; and the nature and functions have been variously determined. Leydig made the vesicles to be one of his three classes of organs for a sixth sense; Wagner supposed them to be electrical excitants; but the majority agreed in regarding them as tactile organs. In 1888, in my work on the "Lateral Canal System of the Selachia and Holocephala," published by the Museum of Comparative Zoology, it was proved that the vesicles belonged to the lateral system, as seen on the skates and sharks, and it was shown that they were not confined to the torpedo, but were found on such genera as Urolophus, Potamotrygon, and Disceus of the rays, where they were simple rudimentary remnants of the lateral canals. My conclusions are amply confirmed by Dr. Coggi from the embryology of torpedo, in the early stages of which he traces the ventral canals, as in embryos and adults of other Selachia. He finds various stages of canal disruption corresponding with those I had figured from the Batoids above mentioned.

Dr. Coggi's assertion that the hypothesis making the vesicles of Savi a special modification of the lateral line system was first brought forward by M'Donnell, 1864, is one to which I should take exception. It must be due to misunderstanding of M'Donnell's statements. That author enumerates five structures that "may be, or have been, confounded with different parts of the lateral line system," and he describes the last one of the five as "The bodies discovered by Savi in the torpedo (*appareil folliculaire nerveux*) — which last, however, may be related to the lateral line, as I shall afterwards attempt to show." This is sufficiently involved to make his meaning very doubtful. But to prove that M'Donnell did not advance the idea of identity of follicles and lateral lines we have only to turn to the penultimate paragraph of his article, where he classes the follicles with other tactile organs, and says that they, one and all, appear to be distinct from the system of the lateral line, which, he says, has more the appearance of a cutaneous excretive organ than of one of sensation (Trans. R. Irish Acad., XXIV., 1864, read 1862, page 161). Up to the present I have learned of no proof or assertion of identity of Savi's follicles and the lateral canal system previous to that in my work of 1888.

Respecting the utility of the follicles it may be added here that my conclusions are at variance with those of all who have heretofore discussed the matter, insomuch that I consider these organs to be practically without special function, and to represent only a transitory condition of the lateral system, intermediate between functional perfection, in the embryo, and ultimate more or less complete disappearance, during the life of the individual. As the organs are absent from particular species or from older individuals, and are rudimentary and irregular when present, this seems to me the only tenable conclusion. S. GARMAN.

Museum of Comparative Zoology, Cambridge, Mass., Feb. 29.

BACTERIA IN DRINKING WATER.

DR. W. MIGULA (*Centralbl. f. Bakt. und Parasitenk.*, Bd. VIII., No. 12, p. 353) makes a contribution to our knowledge of this subject which is really a new departure as regards the examination of drinking water. He points out that, although considerable stress has been laid on the examination of water for pathogenic organisms, there is no reliable rule to guide the hygienist in his examinations for the ordinary saprophytic organisms and their relation to the purity of water to be used for drinking purposes. Dr. Migula washes out small flasks with bichloride of mercury; then, after rinsing them with the water to be examined, he leaves a specimen in the flask, which is plugged with sterilized cotton wadding and covered with an india-rubber cap. It is not necessary to pack the flasks in ice, as it is assumed that if any of the organisms multiply they will all do so, while if the putrefactive organisms (those that liquefy gelatine) grow more rapidly than the others, independent evidence is obtained of the impurity of the water. Cultivations are made in flat glass dishes in order to save the time required in manipulating plates and tubes during the cooling process. After examining 400 springs, wells, and streams, the author has come to the conclusion that where there are more than ten species in any sample of water, especially when these are not species ordinarily met with, the water should not be used for drinking purposes. He found that in only fifty-nine waters was this the case, but that 169 waters contained more than 1,000 organisms per cubic centimetre, sixty-six of these having over 10,000 (forty over 50,000). From these figures it will be seen that some of the sources of supply would be condemned by the old method but would be passed by the new, and some condemned by the new would be passed by the old. Migula found in all twenty-eight species,

and in a series of tables he brings out the fact that the number of colonies does not by any means correspond with the number of species, though in some cases it undoubtedly does so. This is, in fact, an exceedingly variable quantity. It also comes out that putrefactive bacteria are almost invariably absent from spring water; that they are most frequently found where the number of species is great, and where the number of colonies is between 1,000 and 10,000 per cubic centimetre; that they also occur where the number of germs is below fifty per cubic centimetre, but very seldom where the number is over 10,000.

Dr. L. Schmelk, who recently (*Centralbl. f. Bakt. und Parasitenk.*, Bd. IV., No. 7, p. 195) pointed out that there is a great increase in the number of bacteria in the water supply of Christiania during the period that the upland snows are melting most actively, now (*Centralbl. f. Bakt. und Parasitenk.*, Bd., VII., No. 4, p. 102) gives further evidence collected during the last three years in proof of his theory. The numbers he finds for those years were ten or fifteen per cubic centimetre in March to 2,500 in April, 1888; 1,100 in 1889, and on March 28, 1890, 5,000; the breaking up of the winter snows having occurred this year much earlier than usual. This is the period during which the winter snows are melting, and after this is completed there is no marked increase in the number of bacteria in the lake water until the reappearance of the winter snows, some of the earlier falls of which during October, November, and December melt and disappear. In December the number of bacteria per cubic centimetre sometimes reaches 600, the highest point recorded during the year except in March. Dr. Schmelk thinks that the increase is due to the action of frost in breaking up the earth's surface, from which the contained organisms may be set free as soon as a thaw occurs and then washed away along with the surface soil, just as during great rain-storms. He also points out that the masses of ice projecting into a river may form "collecting" points for the particles suspended in the flowing water, as more bacteria are always found in the water obtained from such ice when melted than in the river water itself. He verified this by repeated experiments. He found, however, that when floating ice was melting in water, though it contained a few more organisms than water collected near the surface, it held far fewer than water taken from a considerable depth. In the Christiania water-supply he found some thirty species of bacteria, some of which occurred very seldom, some at certain periods of the year only, and a few all the year round. The amount of solids in the water varies from time to time, between 0.92 and 0.94 grammes per litre, and traces of ammonia can usually be found in water during the time that it contains most bacteria.

THE CHINOOK JARGON.

DURING my visits to the north Pacific coast I became familiar with the Chinook Jargon as spoken in various districts. The jargon is used nowadays most extensively on Puget Sound and in British Columbia, while its use on Columbia River and in the neighboring parts of Oregon and Washington is rather restricted. It has spread as far north as Chilcat and as far south as northern California. The Jargon, as spoken on Puget Sound and farther north, contains a much smaller number of words than the printed vocabularies, a great number of the Chinook words being dropped.

On Columbia River and Shoalwater Bay I found a few additional words belonging to the same dialect of the jargon which was recorded by Horatio Hale and George Gibbs. In recording these words I made use of the same phonetic spelling which has been used in the reports to the British Association for the Advancement of Science on the North-western Tribes of Canada: To accompany, *ā'ɛc* bone of fish, *pēk'*; to call, *tɛō'lak*; to carry on back, *tō'itc*; to dream, *mō'sum nā'nitc*; to give food, *ō'ma* (Chihalish); to give present, *k'oē'ɛn*; grandchild, *kōi'm* (Chihalish); last, *ubō't* (= French au bout?); let us, *hau'ansē*; to make, *qē'lɛmitl*.

Mamook has acquired an obscene meaning, and is no longer in use on the Columbia River. Muskrat, *tsini'stsinis*; fire is out, *tcqup*; to pursue, *mē'tl'ɛn*, or *tɛ'k·s'ɛn*: to put aside, up, *t'ō'ɛn*; to rest, *alē'm*; to roast, *p'ɛ'nis*; robin, *pil k'outē'n* (= red-belly); to sew, *kyē'pot*; soup, *bō'yō* (French); to stop, *k'a* (Chinook); tail, *tēl* (English); to vomit, *ō'ɛ*.

One expression which is not found in the published vocabularies, and which is unknown on Columbia River, was obtained on the Siletz Reservation, Oregon: at that time, *kōpa k·oā'ɛt*. In a few cases the meaning of the words differed somewhat from that given in the vocabularies: to sew, *mamook tipshin* (Hale, "The Oregon Trade Language," p. 60); it means, on Shoalwater Bay and in Clatsop, to mend. To lose the way, *tseepie wayhut* (Hale, p. 60), is not used on Shoalwater Bay, *tseepie* meaning only, to miss an aim. To vomit, *wagh* (Hale, p. 52), not in use in the same region. To tear, *kluh* (Hale, p. 45), means also, to fall.

A number of words which were considered as the sole and original property of the jargon prove to be of Chinook origin: *anah*, exclamation of pain or displeasure; *heehee*, to laugh; *humm*, stinking; *kwehkweh*, mallard duck; *lala*, long time; *liplip*, to boil; *na*, interrogative particle; *nah*, interjection: ho! look here!; *poh*, a puff of breath; *toto*, to shake.

I believe almost all onomatopoëtic words of the jargon are derived from the Chinook. The word *kwaddis*, whale, which is given as a jargon word, is of Tillamook origin. A few other words, the origin of which could not be traced, belong to the lower Chinook: *ekkeh*, brother-in-law; *kelapi*, to turn; *tukwilla*, nuts. Two words, which have been derived from English, are more probably of Chinook origin: *till*, tired (*tɛl* in Chinook); *spose*, if, which is generally derived from "suppose," but is more frequently pronounced *pōs* on Columbia River. *Pōs* means in Chinook, if; so that *spose* may be explained as due to folk-etymology on the part of the traders, or *pōs* as folk-etymology on the part of the Chinook.

It is of interest to note that two Nootka words which are found in the jargon have very close analoga in Chinook: *chuck*, water (*tltcuk* in Chinook); *wawa*, to speak (*awā'wa* in Chinook). A number of Chinook terms which have been embodied in the jargon have become extinct in Chinook proper. This is due to the fact that they have been dropped after the death of persons whose names resembled these words: *tmē'maluct* (jargon, *mimaloose*) is now *tɛmēuwa'lɛma*; *it'amā'noac* (jargon, *tamahnowus*) is now *iō'tlema*.

FRANZ BOAS.

Worcester, Mass., February.

NOTES AND NEWS.

EXPERIMENTAL psychology can count four new laboratories among its acquisitions during the present academic year, those that have been or are about to be established at Heidelberg (Germany), Geneva (Switzerland), Cornell (New York), and the Catholic University (Washington).

— The Oriental Club of Philadelphia was organized in 1888 with Professor Herman V. Hilfrecht as president, Professor M. W. Easton, treasurer, and Stuart Culin, secretary. It has held regular monthly meetings since that time, at which formal papers were read and discussed. The membership of the club is limited to thirty, and now numbers twenty-five, including Professor Paul Haupt and Dr. Cyrus Adler of Johns Hopkins University, Professors Barton, Hopkins, and Collitz of Bryn Mawr College; Professors Jastrow, Easton, Hilfrecht, Brinton, and Peters of the University of Pennsylvania, the Rev. Dr. Morris Jastrow, and others, it being strictly confined to oriental scholars.

— At the February meeting of the Oriental Club of Philadelphia, Mrs. Cornelius Stevenson read a paper on "Two Ancient Forms of Religious Symbolism, the Stone Axe and the Flying Sun-Disc." "The stone axe," the speaker said, "is the weapon of the power