delayed germination of seeds, discovering that the cause generally lies in the seed coats, rather than in the embryos. In the case of the well-known 'upper seed' of the cocklebur, it is found that the delay is secured by the seed coat excluding oxygen; while in many seeds it is secured by the coats excluding water. John Donnell Smith publishes his twenty-eighth paper entitled 'Undescribed Plants from Guatemala and Other Central American Republics.' Clayton O. Smith describes with the aid of half-tone illustrations a bacterial disease of Oleander occurring on young Oleanders in California, which proves to be the same disease that causes knot-like growths on the olive.

The November *Journal of Nervous and Mental Disease* opens with a discussion of the cerebral element in the reflexes and its relation to the spinal element by Dr. G. L. Walton and Dr. W. E. Paul. Dr. Wharton Sinkler contributes the report of a case of Landry's paralysis with the unusual result of recovery, and Dr. Morton Prince gives an account of a case of brain tumor characterized by a circumscribed limited area of anesthesia, marked muscular atrophy appearing early, epileptiform attacks of hemialgesia of a peculiar nature; loss of the muscular sense, astereognosis, ataxis and paresis, increasing to ultimate paralysis. A study by Dr. Harvey Cushing of sexual infantilism with optic atrophy in cases of tumor affecting the hypophysis cerebri completes this part of the number.

DISCUSSION AND CORRESPONDENCE.

A DEFINITION OF FLUID.

In discussing Professor Elihu Thomson's paper on vulcanism Dr. Alfred C. Lane[1] asks: "Are we clear as to where we are to draw the line between viscous fluid and solid?" and he then gives a definition of fluid which is certainly an improvement on the old description of a fluid as a substance which will conform to the shape of the containing vessel and will present a level upper surface.

Dr. Lane's definition, however, does not answer the question: Where shall the line between solid and fluid be drawn? He cites molasses candy and tar as bodies which apparently are solids but which really are fluids; but he takes no account of the fact that it is changing conditions external to matter which determine the appearance and disappearance of many of its physical and chemical properties. At the temperature of liquid air both molasses candy and tar would lose the property of highly viscous fluidity, which they assume under the ordinary conditions whereunder we have become familiar with them, and would acquire a rigidity which would make them solids in the most approved sense. The place to draw the line between solid and fluid is at the junction of conditions which determine the supercession of the solid by the fluid state. This point was long ago recognized as a physical constant of matter and has received a name—plastic yield-point. This point, like melting-point, boiling-point and simple gas-point, separates two of the phases or states of aggregation through which matter passes in the course of its transformation from the highest to the lowest degree of polymerization.

Plastic yield-point, like melting-point and boiling-point, is a function of both temperature and pressure, and can, therefore, be represented graphically by a curve drawn with reference to temperature and pressure as rectangular coordinates. Under conditions fixed by a point on the curve of its plastic yield-point, a substance is on the dividing line between its solid and fluid phases. An increase of either temperature or pressure would (if a path be open) occasion molecular shearing—that is, differential motion between *molecules*—at any point in the mass. A decrease of either temperature or pressure would place the substance under conditions represented by the area on the other side of the curve, where the intermolecular locking is strong enough sensibly to resist (within the time considered) the force tending to make the molecules glide over one another; this is the distinctive property of solids. For all purposes of mechanics, including cases arising in dynamic geology, a fluid may be described as matter exposed to conditions which place it in the region beyond

[1] Science, N. S., Vol. XXIV., No. 613, p. 404.

the curve of its plastic yield-point in the direction of increasing temperature or pressure.

As to the internal constitutive differences which distinguish the fluid from the liquid state much remains to be learned, but it is regarded as probable that these differences are to a large extent grounded in a difference in molecular complexity; fluid and liquid doubtless bear to one another the same relation as vapor and gas, which usually always differ in molecular weight. Thus, sulphur vapor at 445° C. has the molecular formula S_8; as the temperature of this vapor is raised, the complex molecule S_8 undergoes a disintegration and finally becomes S_2, which is not broken up until the temperature has become very high. At a point which we may call the simple gas-point the complex molecules of the vapor phase give place to the simple molecules of the gas phase. Both boiling-point and simple gas-point vary with the temperature and pressure, and hence both may be represented graphically by curves. The vapor phase or condition will lie between these two curves, and such a phase is common to practically all substances that can be boiled.

Now when a solid is heated under atmospheric pressure it first softens and then melts; and this intermediate stage of softening, when the substance is neither solid nor liquid, is properly the fluid phase or state, comparable to the vapor phase which is intermediate between liquid and gas. It can hardly be doubted that in the solid phase the molecular weight is the largest possible. When the yield-point is attained, these large molecules just begin to break up into smaller units and this process is continued until the melting point is reached and the substance becomes a liquid; in this condition the molecular complexes are very stable, and, like the simple gas molecules, generally require large additions of energy to undergo further change.

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WHY DO HERRING GULLS KILL THEIR YOUNG?

EARLY last July I was making for the Public Museum of Milwaukee a photographically recorded study of the actions of a colony of herring gulls covering Gravel Island, a little islet at the upper end of the Door County peninsula of Wisconsin. At the time of my visit the young of the year were mostly about half grown and usually kept by themselves in a flock of several hundred. There were always a few young scattered among the adults on the island, but the great majority were at all times to be found in the flock, which seemed to have taken to itself a definite habitat at one part of the islet.

The island is, I am told, visited with some degree of frequency by pleasure-seekers, though as it is fairly remote from any resort I do not fancy that these visits are very numerous in any one nesting season.

When first visiting the island I rowed out to it with two companions, pitched my tent in the center of the island and disappeared within, after which my companions returned to the boat and rowed away. I have reason to believe that my remaining among the gulls was not suspected by them. From various observations I am convinced that the individualities of the young were so hopelessly lost in the flock that they neither knew nor were known by their parents.

Almost from the beginning of my observations and continuing intermittently all through them I was witness of numerous attacks committed by adults upon the young, in which the latter were so severely wounded that death did or in a short time would ensue. At the time of my arrival this year and also when I visited the same colony a year ago the island was strewn with the bodies of some dozens of these half-grown gulls bearing evidence of having been similarly done to death.

Usually when my attention was attracted to the enactment of one of these tragedies the victim was a bird to which I had paid no previous attention; but there were several instances where the young had been under fairly close observation for some hours previous. In no instance could I see that the young was weak, sickly or in any way abnormal, nor that it had given offense for which it was being punished. Sometimes when the flock of young was on the water near the