Degeneration and Evolution.

Mr. H. G. Wells, writing for the *Gentleman's Magazine* (London), says: Perhaps no scientific teaching has been exposed to a greater amount of popular misconception than the doctrine of evolution. In the popular conception, life began with the amœba, then came jelly fish, shell fish, and a miscellaneous mass of invertebrates; then real fishes and amphibia, reptiles, birds, mammals, and man, the last and first of creation. This is not the teaching of science. On the contrary, biology, along with advance, teaches retrogression as its essential complement. Isolated cases of degeneration have long been known. It is only recently that the enormous importance of degeneration as a plastic process in nature has been suspected and its entire parity with evolution recognized. In fact, the path of life so frequently compared to a steady ascent, an indication of an inevitable tendency to higher and better things, is distinctly repudiated by scientific observers. The sounder view is that living species have varied along divergent lines from intermediate forms and by no means necessarily in an upward direction.

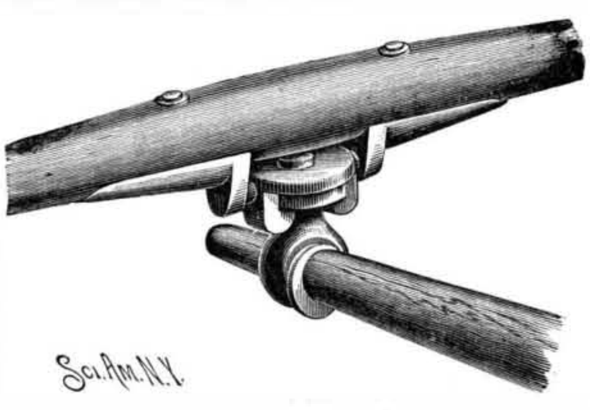
The best known and perhaps the most graphic and typical illustration of the downward course is to be found in the division of the Tunicata. The untrained observer would probably class it near the oyster and the mussel, and a superficial study of its anatomy might even strengthen this opinion. As a matter of fact, however, these creatures are far more closely related to the vertebrata, a fact exhibited in the details of their development. It is a matter of common knowledge that living creatures in the course of their embryonic development repeat, in a more or less blurred and abbreviated series, their generalized pedigree. For instance the developing chick or rabbit passes through a fish-like stage, and the human fœtus wears an undeniable tail. In the case of these ascidians (the Tunicata) the fertilized egg cell destined to become a fresh individual follows an entirely different course from that pursued by the mollusks, the dividing and growing ovum exhibits phases resembling in the most remarkable way those of the lowliest among fishes, the lancelot, or amphioxus. The method of division, the formation of the primitive stomach and body cavity, and the origin of the nervous system are identical, and a stage is attained in which the young organism displays—or simulates—vertebrate characteristics. It has a notochord, or primary skeletal axis, it displays gill slits behind its mouth, as do all vertebrated animals in their earlier stages, and the origin and position of its nervous axis is essentially vertebrate. In these three independent series of structures the young ascidian differs from all invertebrate animals, and manifests its high descent from the vertebrates. It is an evident case of retrogression.

Like a tadpole, this animal has a well developed tail, with which it propels itself vigorously through the water; it has serviceable sense organs, and appears in this, its earlier stages, to be full of vigorous, enjoyable life; but scarcely is this stage attained before the animal undergoes a process of retrogression. It develops suckers, by means of which it attaches itself to the rocks, its tail is absorbed, eye and ear atrophy, and the skin secretes the coarse inorganic-looking "test;" the transient glimpse of vivid animal life is forgotten, and the creature settles down for life to a mere vegetable existence. In some cases the degradation has been a strategic retrogression—the type "stoops to conquer." This is, perhaps, most manifest in the case of the higher vertebrate animals. It is one of the best known embryological facts that a bird or a mammal starts in its development as if a fish were in the making, and that later the organs get twisted and patched to fit a life cut of water—nowhere organs built specially for this very special condition. There is nothing like this in the case of a fish. There the organs are from the first recognizable sketches of their adult forms, and they develop straightforwardly, but the higher types go a considerable distance toward the fish, and then turn round and complete their development in an entirely opposite direction. This turning is evidently precisely similar in nature, though not in effect, to the retrogression of the ascidian after its pisciform or larval stage.

If a zoological investigator could have visited the earth during the upper Silurian period, and with prophetic eye could have singled out the ancestors of man, he would have found them, not among the dominant placoid fishes of the Silurian sea, but in the *Dipnoi* or mud fish, swimming in the pluvial waters, or inert and caked over by the torrid mud. He would have found in conjunction with the purely primitive skull, axial skeleton, and fin possessed by these Silurian mud fish a remarkable adaptation of the swimming bladder to the needs of the waterless season. It would have undergone the minimum amount of alteration to render it a lung, and blood vessels and other points of the anatomy would show correlated changes. Here we have the old story of degeneration over again; the mud fish had failed in the struggle, they were less active and powerful than their rivals of the sea, and they had taken the second great road of preservation—flight. Just as the ascidian has retired from an open sea, too crowded and full of danger to make life worth the trouble, so, in the older epoch, did the mud fish. They preferred dirt, discomfort and survival to a gallant fight and death. Very properly, then, they would be classed in our zoologist's scheme as a degenerate group. But some of them have risen in the world again; they came out of the rivers, gave birth to the amphibia of the coal, which gave place presently to the central group of reptiles, from which sprang divergently birds and mammals, and finally the last of the mud fish family, man—the heir of all the ages.

AN IMPROVED NECK YOKE.

The yoke center for connecting the neck yoke with the pole of a vehicle, as shown in the accompanying illustration, has been patented by Messrs. David H. Gotshall and Herbert Petit, of No. 507 Second Street, Astoria, Oregon. The yoke is of the usual construction, and in elbow lugs attached by bolts to its under side are journaled the trunnions of a circular plate having a depending flange, which extends around all the front side of the plate, and is doubled under at right angles to receive the head of a pole ring. The head may be readily slipped into a recess of the plate, and a neck between the body of the ring and the head comes opposite the bent portion of the flange, so that the ring may have all necessary movement. The ring is prevented from accidental removal by a pin extending through the plate and into the head of the ring, but there will be little strain on the pin, the lateral strain from the flat head coming on the flange of the plate. The ring is lined with leather or other suitable material to prevent wear and rattling. This yoke center is



GOTSHALL & PETIT'S NECK YOKE.

designed to be safe, durable, and inexpensive, moving freely in relation to the pole, while not permitting the yoke to pound thereon.

Modification of the German Patent Law.

An amendment of the patent law of 1877 has been passed by the Reichstag, and went into force on the 1st of October. The chief point to be noticed in the new law is that the examination of patents with regard to novelty is not to be abolished. The new law does not decide what amount of invention is patentable, so that this question must be settled in each case by the Patent Office as heretofore. Publication, if made more than a hundred years ago, is not to act in anticipation of a patent. Patents taken out in foreign countries are to act in anticipation against the inventor, and those claiming rights under him, only after a lapse of three months, and thus an extended period of time is allowed by the act for an application for a patent in Germany. If an invention is stolen from another person, and an application for a patent has been made, the inventor is able not only to oppose the granting of a patent to the applicant, but to obtain a patent for his own application. The patent fees may be paid for the whole duration of a patent in advance, so that the lapse of a patent through delay in the payment of fees may be rendered impossible. If a patent on which the full fees have been paid should be afterward annulled, the fees will be returned to the patentee. An application for the annulling of a patent shall not be made when the patent has been in existence more than five years. For the determination of this point, however, a period of three years is provided. The very high fees now payable for a German patent have not been diminished by the new act, but it is provided that such a lowering of the fees may be made by order of Federal Council. The important provision that a patent may be revoked after the expiration of three years if the patentee fails to carry out his invention in Germany to a suitable extent, or at least to do everything that he can to carry it out, remains in force, and should be particularly noticed by foreigners. The organization of the Patent Office is to be so regulated by the new act that there may be greater security for a proper and efficient examination of patents. Before an application is refused, the applicant is to have an opportunity of answering objections to the granting of a patent. If he should fail to obtain a patent, he may then support his claim by oral evidence. At the preliminary examination expert witnesses may be called, and a statement of the various attempts which the inventor had made may be presented. If the decision of a judge puts a new aspect on the case, the applicant is to have an opportunity of answering any objection raised. A proviso which is of great importance to chemical industries is that where proceedings are taken to patent a new material, every material of similar manufacture is regarded as included in the claim until proof to the contrary is shown. The damages payable for the infringement of a patent have been increased. The Patent Office, Berlin, was established at its new building in April last. This new office is in every respect suitable for its purpose, whereas the old one was too small. The public obtain a great advantage from the new arrangement, since the important technical library is now open to all persons from 9 A. M. to 9 P. M.

Lumber at Portland, Oregon.

The *Oregonian*, in speaking about the lumbering interests of Portland and vicinity, says: The principal forest tree indigenous to Oregon soil is the fir. For heavy frame work of all wooden structures, for bridge timbers, and even for boat building, the fir is the best timber in the world. It has all the tenacity of fiber of the best oak, without the propensity to split of the latter, and its lasting properties, when exposed to all the severity of weather, are not equaled by any other available timber in the world. It has been found by actual experiment that a piece of fir timber, when submitted to a heavy strain, did not break as soon as a piece of well seasoned oak of the same dimensions. It is only within the last five years that the Union Pacific, one of the greatest of the transcontinental lines, became convinced that fir was the safest, most economical, and strongest timber for wooden bridges that could be obtained in the United States, and Portland-cut fir is now regularly shipped by this company as far east as Omaha, for use in their new reconstructed bridges. Large quantities of this same wood are now used by this company in the construction of cars for their line.

The average price at the Portland mills, for both rough and dressed lumber, is about $14 per 1,000 feet. This price may vary a little at times, but long years of experience in this line has convinced the mill men of this city that lumber cut here cannot be sold profitably on an average for less than these figures.

The supply of logs for the local mills is now obtained from the banks of the Columbia River and its tributaries north of Portland. Along the banks of the upper Willamette there is a supply of good timber, but this timber cannot reach Portland, owing to the obstructions to floating rafts in the falls of the Willamette, at Oregon City, twelve miles north of Portland. The large rafts of logs from the Columbia are now towed up to the Portland mills by steamers regularly engaged in this traffic, at the rate of about 75 cents per 1,000.

Up to within a year past the Portland sawmills enjoyed a large and steady sale of their product to all points on the Union and Northern Pacific between Portland and the Missouri River. Last season most of this trade was cut off from the Portland mills, owing to the scarcity of cars furnished by the railroad companies for the transportation of this lumber East. The lumbermen of Portland have a great cause for complaint against the transcontinental lines of roads out of Portland the present season, in the matter of discriminating freight rates on lumber in favor of the South, as against Portland. A delegation of the Portland lumbermen, headed by Mr. H. R. Duniway, one of the youngest but brightest men in this business in the Northwest, recently went East with a view of laying their complaint before the traffic managers. Chairman Walker, of the Western Traffic Association, has called a meeting of the traffic managers of the different railroads in the association for this month, and it is the hope of the lumbermen of Portland that new rates will be made on the shipment of lumber which will be entirely satisfactory to the Portland mills.

In addition to the cutting of fir, cedar is sawed in small quantities by the local mills, and oak and ash are sawed, to a limited extent, by small mills in Portland. Along the low lands of the Columbia and Willamette Rivers are immense forests of cottonwood, a wood that is specially valuable for box making and for the manufacture of wood pulp for paper making. This latter wood is now sent to Portland in considerable quantities for the purposes above named.

The sawing of lumber in Portland furnishes steady employment to about 800 men, and yearly pays out in wages $600,000. There is about $1,900,000 invested in the saw mill plants of Portland, and the yearly sales of lumber made by these mills will approximate $2,500,000.

THE tide tables for the Atlantic Coast of the United States, together with 206 stations on the Atlantic Coast of British America, for the year 1892, published by the United States Coast and Goedetic Survey, are now ready for issue, and copies can be obtained for twenty-five cents at the agencies of the survey in this city, or by addressing the office at Washington.

Thought.

We do not fully understand or at least are not agreed as to the nature or character of normal mentality. Two or three generations ago it was believed to consist in the activity of a soul or spirit, which was enthroned somewhere in the brain. No explanation of the *modus operandi* of such activity eventuating in thought, as independent of the body, was apparently ever deemed necessary, or considered as a legitimate scientific inquiry.

In more recent times, and especially since the microscope has revealed to us the wonderfully complex and highly organized texture of the brain; and modern physiological research has made known more perfectly the functions of many parts and organs of it, the old theory has been rejected, and a leap has been made to the other extreme. A theory has been accepted by some to the effect that the whole thought process consists simply in the molecular activity of this highly organized cell-structure of brain. The hypothesis that a soul or any special entity exists within the brain or elsewhere in the body is a snare and a delusion and without proof. As a working theory for elucidating the phenomena of mind it is worse than useless. Perceptions, memory, reason, judgment, all consist of mere movements or vibrations of different kinds or degrees of multitudinous nerve fibrils and cells, which are composed of matter in its most highly organized form. Attention and will are only different forms of this same activity of nerve tissue as it becomes affected through external or internal impressions, while under the influence of the blood. In the words of one of its most vigorous advocates, "that which thinks, reasons, wills; that which is consciousness in phenomenon—is the brain; not any suppositious entity, of the existence of which we have no evidence whatever, and of the need of which as an hypothesis he is not conscious."

On the other hand, however, there are some who still feel conscious of the need of an additional element in any hypothesis which is assumed as a working basis for elucidating the physiology of the thought process. They are unable to accept mere assertion for argument, and much less for demonstration. They freely admit the dependence of mind upon the brain and nervous system in its exhibitions, and that no such processes as memory, reason, attention, and will, can be perfected and projected to other minds except by the agency of the brain; also that these several activities of the mind are defective and imperfect, weak or strong, largely in proportion as the brain is in a normal or abnormal condition. They also admit that the hypothesis of molecular activity only has the merit of simplicity, and if true ought soon to place us on vantage ground in elucidating the physiology of mind. But, on the other hand, they cannot remain indifferent to the fact that any hypothesis, to be accepted as reasonable, must harmonize with and cover the phenomena to be explained. Now, does molecular activity, or the vibration of cells and fibrils upon each other, present any resemblance to thought? Such vibration presupposes and consists simply in movement. This movement may occur with the inconceivable rapidity of light, but, after all, it is only movement, and if there results from or in connection with that movement of the anatomical elements of brain, something of a nature unlike motion, then it becomes necessary to add another element, which resides in the material affected by movement, to explain the phenomena presented. This element must be akin, in its nature, to that which results, namely, thought. The nature of movement is simple and homogeneous in whatever realm of matter it may appear, and, so far as we know, it becomes only motion; but thought, as it appears in reason, will, imagination and judgment, has no resemblance to mere motion. It may be attended by or be dependent upon it, but in its essence and qualities it is so unlike it that the two cannot be compared. Mere movement of cell, whether simple or complex in its constitution, therefore, becomes as unscientific as an explanation of thought as mere movement of spirit.

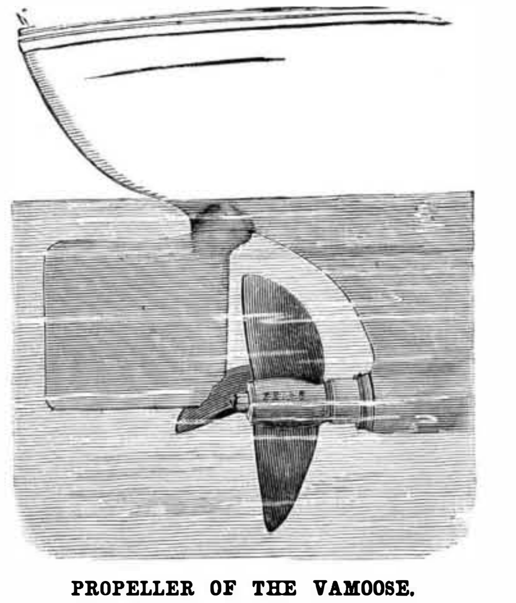
Such considerations are thought to require that, in the solution of the thought problem, another element must be added. This resides in the brain and nervous system, and in the processes of thought, reflection, memory, and judgment, there exists a correspondence or parallelism of action between the cell and this additional element. The one may act upon, or be acted upon by, the other through impressions from without, and in this action and interaction, the quality and character of thought becomes modified, approved or disapproved, and in some measure changed.

Such, then, in briefest words are the hypotheses which have been advanced as explanatory of normal mentality. How far either of them may or may not be likely to meet with future demonstration, it is not my purpose to argue, even if it were a legitimate subject for such an occasion, but simply to call attention to the fact that neither of these hypotheses has yet been accepted by all; and also that physiology has not yet vouchsafed to us any scientific demonstration on this matter.—*Henry P. Stearns, M.D., address before the Association of Medical Superintendents, etc.*

THE PROPOSED RACE BETWEEN FAST STEAM YACHTS.

The trial of speed shortly to come off between the two fast steam yachts Vamoose and Norwood, over an 80 knot course in Long Island Sound, has attracted a large degree of public attention, particularly among all who are in any way interested in yachting. The course is of sufficient length to thoroughly test the qualities of the racers, and is laid due west from Fisher's Island to a point opposite the Larchmont Club house, near the western end of the Sound. Our first page illustrations give a good idea of the general appearance of the two boats, accompanied with drawings of their machinery, in which connection is also presented a view of the Cushing, our fast torpedo boat, which yachtsmen generally had hoped would be a participant in the race, but which the government officials could not, under the navy regulations, consent to.

The Vamoose was built by the Herreshoffs, of Bristol, R. I., for Mr. W. R. Hearst, of San Francisco, and her cost is said to have been $65,000. She is 112 feet 6 inches long over all, and about 108 feet long on the water line, her extreme beam being 12 feet 4 inches and her greatest draught 4 feet 11 inches. Her hull consists of a steel frame, uncovered in the interior of the boat, and with an outer covering of two layers of pine, the inside one of which is seven-eighths inch thick white pine and the other five-eighths inch thick yellow pine, there being nothing in her in the way of finish or decoration. Her engine is quadruple expansion, and there are five cylinders, of the following diameters: one of $11\frac{1}{4}$ inches, one of 16 inches, and three of $22\frac{1}{2}$ inches each, the stroke, common, being 15 inches. The propeller shaft is $5\frac{1}{4}$ inches in diameter. The condenser is of copper, and is 5 feet 3 inches long and 31 inches in diameter, containing 498 feet of tubing, the circulating pump being worked by an independent little engine. The engine and its equipment weighs $13\frac{1}{2}$ tons, and is designed to develop 800 horse power. The boiler is of the Thornycroft pattern, and is 8 feet 4 inches long and 8 feet 6 inches in diameter. It has three main drums and 8,500 feet of cold drawn steel tubing. Forced draught is afforded by a fan working up to 1,000 turns a minute. The smokestack is 8 feet high above the deck, and is 36 × 21 inches in diameter. The boat is lighted by electricity generated by a Riker motor. She has a three-bladed Seise propeller, shown in one of our views. It is 54 inches in diameter, and drops 21 inches below the lowest part of the keel. It is designed to be revolved 400 times a minute to propel the boat at full speed.



PROPELLER OF THE VAMOOSE.

The Norwood was built by C. D. Mosher, of Amesbury, Mass., for Norman L. Munro, of New York. She is only 63 feet 2 inches long over all, and about 60 feet long on the water line. She is 7 feet 2 inches beam amidships, and her greatest draught is 22 inches, her draught forward being only about 9 inches. A cross section of each boat at the midship section shows a nearly semicircular bottom. The hull is built of two thicknesses of mahogany on a strong oak frame, and has a steel keelson. The stern is cut away to make room for the propeller, which has three blades, and is 36 inches in diameter. It has a pitch of 7 feet 6 inches, and is designed to be driven at the rate of 500 turns a minute. The engine is of the triple expansion type, the cylinders being 9 inches, $14\frac{1}{4}$ inches, and 22 inches in diameter respectively, and the stroke 9 inches. At 500 revolutions a minute the engine is designed to develop 450 horse power. The boiler is somewhat of the Thornycroft type, but with important modifications. It is 7 feet 4 inches long and 5 feet high, the working pressure being counted at 200 pounds and over. The condenser is 6 feet long and 18 inches in diameter. The smokestack rises 3 feet 9 inches above the top of the boiler, and it is 18 inches in diameter. In cruising trim the boat is covered with an awning which may be inclosed with glass, but in racing order she is stripped to the hull.

Table Customs of Our Ancestors.

A thousand years ago, when the dinner was ready to be served, the first thing brought into the great hall was the table. Movable trestles were brought, on which were placed boards, and all were carried away again at the close of the meal. Upon this was laid the tablecloth, which in some of the old pictures is represented as having a handsome embroidered border. There is an old Latin riddle of the eighth century in which the table says: "I feed people with many kinds of food. First I am a quadruped, and adorned with handsome clothing; then I am robbed of my apparel and lose my legs also." The food of the Anglo-Saxon was largely bread. This is hinted in the fact that a domestic was called a "loaf-eater," and the lady of the house was called a "loaf-giver." The bread was baked in round, flat cakes, which the superstition of the cook marked with a cross, to preserve them from the perils of the fire. Milk, butter and cheese were also eaten. The principal meat was bacon, as the acorns of the oak forests, which then covered a large part of England, supported numerous droves of swine. Our Anglo-Saxon forefathers were not only hearty eaters, but unfortunately deep drinkers. The drinking horns were at first literally horns and so must be immediately emptied when filled; later when the primitive horn had been replaced by a glass cup, it retained a tradition of its rude predecessor in its shape, for it had a flaring top while tapering toward the base, so that it, too, had to be emptied at a draught. Each guest was furnished with a spoon, while his knife he always carried in his belt; as for forks, who dreamed of them, when nature had given man ten fingers? But you will see why a servant with a basin of water and a towel always presented himself to each guest before dinner was served and after it was ended. Roasted meat was served on the spit or rod on which it was cooked, and the guest cut or tore off a piece to suit himself. Boiled meat was laid on the cakes of bread, or later on thick slices of bread called "trenchers," from a Norman word meaning "to cut," as these were to carve the meat on, thus preserving the tablecloth from the knife. At first the trencher was eaten or thrown upon the stone floor for the dogs which crouched at their master's feet. At a later date it was put in a basket and given to the poor who gathered at the manor gate. During the latter part of the middle ages, the most conspicuous object on the table was the salt cellar. This was generally of silver in the form of a ship. It was placed in the center of the long table, at which the household gathered, my lord and lady, their family and guests, being at one end and their retainers and servants at the other. So one's position in regard to the salt was a test of rank—the gentlefolks sitting "above the salt" and the yeomanry below it. In the houses of the great nobles dinner was served with much ceremony. At the hour a stately procession entered the hall. First came several musicians, followed by the steward bearing his rod of office, and then came a long line of servants carrying different dishes. Some idea of the variety and profusion may be gained from the provision made by King Henry III. for his household at Christmas, 1254. This included thirty-one oxen, one hundred pigs, three hundred and fifty-six fowls, twenty-nine hares, fifty-nine rabbits, nine pheasants, fifty-six partridges, sixty-eight woodcocks, thirty-nine plovers, and three thousand eggs. Many of our favorite dishes have descended to us from the middle ages. Macaroons have served as dessert since the days of Chaucer. Our favorite winter breakfast, griddle cakes, has come down to us from the far-away Britons of Wales, while the boys have lunched on gingerbread and girls on pickles and jellies since the time of Edward II., more than five hundred years ago.

A Remarkable Ferryboat.

One of the most extraordinary boats on the American lakes is a passenger car transfer ferryboat operated in the Straits of Mackinac by the Duluth, South Shore, and Atlantic Railroad. It has an enormous capacity for carrying cars, but its peculiarities are its strength, its shape, and the number of its steam engines. It carries twenty-four steam engines for the performance of the various requirements of its daily business. The hull of the boat is as solid as the walls of an old-time block house. The bow rises from the water so as to hang or slant over it as if it were a hammer—and that is what it was built to be. The boat is an ice breaker, intended to keep a channel open in the straits during the winter, or to make one whenever it is pushed into the massive ice that forms in that cold region. The big boat advances toward the ice and, shoving her nose upon its edge, lifts herself upon it. Then a screw propeller under the overhanging bow performs its work of sucking the water from under the ice to enable the boat's weight to crush it down the more easily. Thus the destructive monster makes her way steadily through the worst ice of the semi-polar winters of that region, climbing up on the ice, crushing it down, scattering it on each side, and making no more of it than if it were so much slush.—*Iron Age.*