temporarily been secured in Baltimore, on the outskirts of which city are the grounds Mr. Hopkins has left for the hospital and university which in future will bear his name. The trustees have already selected the President of the University, and an admirable head they have found in Mr. Henry Gillman, formerly the Principal of the San Francisco University. Mr. Gillman is now in England, maturing his plans and gaining information from various universities in Europe. The dominant wish of the new president is to gather round him a body of professors and lecturers devoted to original research in their different spheres. Only one chair has yet been filled, namely, that of Mathematical Physics, and to this Mr. H. A. Rowland has been appointed. Though still quite a young man, the good work Mr. Rowland has already done in magnetism has made his name well known among English physicists, and in his new position a brilliant career lies before him. It is hoped that students will be received in 1876, and we heartily wish Mr. Gillman every success in his noble work.

SCIENCE IN GERMANY

(*From a German Correspondent.*)

MUCH as may have been written about bone-formation, yet this theme seems still to be inexhaustible, as in the current series of the "Archiv für mikroskopische Anatomie" (of which we gave the contents in a former report) no less than three papers are published on this subject. Two of these, those by Strelzow and by Stieda, speak of the ossification of cartilage and of bone-growth, and arrive at quite contradictory results. The older view on bone-growth starts from the supposition that the bones once formed undergo no further plastic change, that their single parts cannot displace each other, that therefore an insterstitial growth cannot be imagined. If the growing bone, as usual, does not merely show a uniform increase in size, but little by little changes its shape too (the bent bones for instance, the bends of which change during growth), this naturally leads to the supposition that besides the deposit of fresh material, a solution or absorption of those older materials took place, which did not fit the new shape. In opposition to this view, which Stieda also defends, Strelzow tries to prove that the bone grows interstitially, that therefore it can change its shape in an outward direction without reabsorption of any of its parts, that it is useless therefore to suppose the latter to take place, and that there is no reason for such a supposition. Now, with regard to the change from cartilage to bone, it has certainly been proved, for most cases, that the cartilage is first destroyed before in its place a bone grows from fresh materials. But while Stieda thinks this the case everywhere, Strelzow observes that the lower jaw and the shoulder-blade form exceptions to the general rule, the cartilage there passing immediately from its softer state to bone. Hertwig's observations, which he makes with regard to his investigations of the teeth of Reptilia, have a much more extensive range. In Hemibatrachia the teeth form earlier than any other bones of the head, and starting from this basis those bones in the oral cavity are destroyed, which only cover the exterior of the original cartilage skeleton, and are therefore called covering bones. In frogs these bones certainly form without the help of the teeth, which only appear at a later stage; but as frogs (Batrachia) and salamanders (Hemibatrachia) are of the same order, and particularly as the former are the more recent family, Hertwig thinks that in their ancestors the formation of teeth took place in the same way as in the salamanders now, but that in course of time they lost the primitive bone-forming teeth and retained only the bones resulting from them. The formation of teeth now observed in frogs is therefore a secondary phenomenon. Just as the bones of the oral cavity have their origin in the teeth, Hertwig supposes the covering bones on the exterior of the head to result from scales, and states that this is still very evident with certain fishes. What is a rule for lower vertebrata may also be applied to the higher orders, so that *all* covering bones may be derived from scales or teeth, which in sharks and rays are still equivalent and homologous formations. Therefore sharks and rays must be looked upon as the oldest forms of Vertebrata provided with bones; they are succeeded first by salamanders, then by frogs, and finally by the remaining reptiles, birds, and Mammalia.

It is a well-known fact that the gland-cells only absorb certain materials from the blood in order to convey them, more or less changed, into the hollow interior of the gland organ, and thus to furnish useful substances to the organism (secretions), or to remove useless ones from the same (excretions). Wittich demonstrates these relations in a particularly clear manner ("Archiv für mikroskopische Anatomie," 1875). After the injection of differently coloured solutions (carmine ammonia, indigo-sulphate of soda) into the blood of living rabbits, these colours are again excreted by the kidneys. If the animals are killed during this excretion, and the glands are examined, the carmine is only found in the gland vessels, not in their cells; the indigo, however, in the cells also. Such experiments evidently show that the gland-cells have a sort of selective affinity for the two colouring materials, letting the one pass entirely, and partly retaining the other in their interior.

In the same journal Neumann acquaints us with an interesting property of the cells which coat the abdominal cavity of a frog. It is known that some of these cells in female frogs are furnished with cilia, by the motion of which the ova ejected from the ovary into the abdominal cavity are introduced into the openings of the oviduct. Waldeyer, in his book, "Ovary and Ovum," had maintained that as the essential parts of the female genital organs result from the coating of the embryonal abdominal cavity, those ciliated cells physiologically connected with them result from the same basis, viz., the germ-epithelium; while the whole remaining coating of the *later* developed abdominal cavity, with its entirely different physiological signification, must be a formation genetically different from the former. Goette had already proved ("Entwickelungsgeschichte der Unke") that all those formations, together with several others, result from the uniform cell-coating of the abdominal cavity of the embryo. Neumann now specially proves their genetic identity by the observation that these ciliated cells only occur at the time of sexual maturity in the uniform epithelium of the abdominal cavity, and that therefore they represent local transformations of the same. This again confirms the theory, which Goette (*l.c.*) defends for the whole organism, that each embryonal part is not unconditionally intended for certain formations (which has been an accepted belief since Remak), but that from one single and uniform part in the embryo quite different tissues and organs can and may result, solely depending on the locally changing conditions of development. For instance, the coating of the embryonal abdominal cavity, besides the parts already mentioned, also furnishes the fibrous tissue of the intestines, the kidneys, and the heart.

*THE LAWS OF STORMS**

Recent Criticism and Contrary Theories.—The rules referred to in last article are only empirical and are derived from no theory. Mechanics ought to take them in hand and explain them; but it has not been able to do so, for the circulatory movements of both liquids and gases are as yet a closed letter to that science. They are to-day in the same position as were Kepler's laws before

* Continued from p. 403.