things that came out of that Commission's report? This, namely, that most of the teachers of Science in the Army Schools received notice to quit. England, on the high authority of Lord Northbrook, did not want a Scientific Army.

All this by the way. We have referred to these instances, in order to show that the various departments of the Administration want scientific control here as is in France—that M. Deville's suggestion is of value here as there.

Now, assuming that the suggestion is a vital one, or even that it is an important one, and that it is good for England as for France, and we shall gladly open our columns to a discussion on these points; the question arises—is it possible to adopt it here?

We are met at once by the different conditions of the French Academy of Sciences, and our own Royal Society. The Academy is a large paid body; our Royal Society is a small unpaid body, and the work, which M. Deville considers so necessary for the regeneration of France, and which many consider necessary for the salvation of this country, is no temporary or small affair. The labour would be great, enormously great at first, and, moreover. would be a never ending one. To impose such a labour as this on a private body, which was constituted for entirely different purposes, would simply be to destroy that private body altogether, and it would be both unwise and unjust for such a body to undertake it, unless each member had ample means and no occupation. so that all his time and energy might be devoted to the task.

We think, then, that for these and for other reasons, not far to seek, it is impossible for our Royal Society to play permanently the *rôle* here which M. Deville has suggested to the Paris Academy.

But here, at length, is a grain of comfort. We have in England, at the present moment, a body at work, which if the general ideas of the power entrusted to it be correct, may perform those very services for England which M. Deville so loudly calls for—a call which all men of science *d'outre manche* re-echo—in the case of France. We refer to the Royal Commission on Scientific Instruction and the Advancement of Science, on which body, we take it, has devolved just such a general overhauling of all matters scientific within these realms as M. Deville has proposed—a herculean task, but a noble one if done well, and a task which will not be well done unless it is indicated how England can be put in a position second to no other nation so far as Science is concerned, a position that she certainly does not occupy at present.

But supposing all this done, we must have something more. We must have some permanent machinery, and having this we must have the scientific men mindful, above all other things, of the interests of science, and then our politicians will hear no uncertain sound as to the merits or demerits of State aid to the higher education. A nation, as a distinguished foreign *savan* has recently said, must endow science until that nation stands first (1) in abstract Science, (2) in the applications of Science generally, and (3) in the amount of knowledge possessed by State servants of all classes. When she has achieved this point the question of continuing State aid may properly be discussed—not till then. To this let us add that apart from the question of State-aided Science that nation will stand highest which, in addition to the above conditions, calls into her councils her men of Science, and becomes a Science-aided State. EDITOR

PANGENESIS

IN a paper, read March 30, 1871, before the Royal Society, and just published in the Proceedings, Mr. Galton gives the results of his interesting experiments on the inter-transfusion of the blood of distinct varieties of rabbits. These experiments were undertaken to test whether there was any truth in my provisional hypothesis of Pangenesis. Mr. Galton, in recapitulating "the cardinal points," says that the gemmules are supposed "to swarm in the blood." He enlarges on this head, and remarks, "Under Mr. Darwin's theory, the gemmules in each individual must, therefore, be looked upon as entozoa of his blood," &c. Now, in the chapter on Pangenesis in my "Variation of Animals and Plants under Domestication," I have not said one word about the blood, or about any fluid proper to any circulating system. It is, indeed, obvious that the presence of gemmules in the blood can form no necessary part of my hypothesis; for I refer in illustration of it to the lowest animals, such as the Protozoa, which do not possess blood or any vessels; and I refer to plants in which the fluid, when present in the vessels, cannot be considered as true blood. The fundamental laws of growth, reproduction, inheritance, &c., are so closely similar throughout the whole organic kingdom, that the means by which the gemmules (assuming for the moment their existence) are diffused through the body, would probably be the same in all beings; therefore the means can hardly be diffusion through the blood. Nevertheless, when I first heard of Mr. Galton's experiments, I did not sufficiently reflect on the subject, and saw not the difficulty of believing in the presence of gemmules in the blood. I have said (Variation, &c., vol. ii., p. 379) that "the gemmules in each organism must be thoroughly diffused; nor does this seem improbable, considering their minuteness, and the steady circulation of fluids throughout the body." But when I used these latter words and other similar ones, I presume that I was thinking of the diffusion of the gemmules through the tissues, or from cell to cell, independently of the presence of vessels,—as in the remarkable experiments by Dr. Bence Jones, in which chemical elements absorbed by the stomach were detected in the course of some minutes in the crystalline lens of the eye; or again as in the repeated loss of colour and its recovery after a few days by the hair, in the singular case of a neuralgic lady recorded by Mr. Paget. Nor can it be objected that the gemmules could not pass through tissues or cell-walls, for the contents of each pollen-grain have to pass through the coats, both of the pollen-tube and embryonic sack. I may add, with respect to the passage of fluids through membrane, that they pass from cell to cell in the absorbing hairs of the roots of living plants at a rate, as I have myself observed under the microscope, which is truly surprising.

When, therefore, Mr. Galton concludes from the fact that rabbits of one variety, with a large proportion of the blood of another variety in their veins, do not produce mongrelised offspring, that the hypothesis of Pangenesis is false, it seems to me that his conclusion is a little hasty. His words are, "I have now made experiments of trans-

fusion and cross circulation on a large scale in rabbits, and have arrived at definite results, negativing, in my opinion, beyond all doubt the truth of the doctrine of Pangenesis." If Mr. Galton could have proved that the reproductive elements were contained in the blood of the higher animals, and were merely separated or collected by the reproductive glands, he would have made a most important physiological discovery. As it is, I think every one will admit that his experiments are extremely curious, and that he deserves the highest credit for his ingenuity and perseverance. But it does not appear to me that Pangenesis has, as yet, received its death blow; though, from presenting so many vulnerable points, its life is always in jeopardy; and this is my excuse for having said a few words in its defence. CHARLES DARWIN

THE NEW HOSPITAL OF ST. THOMAS

II.

THE large wards of the Hospital contained in the several flats of the Blocks 2, 3, 4, 6, and 7 * are rooms of noble dimensions. In the second, third, and fourth floors, each ward is more than 100ft. long, 38ft. wide, and 15ft. high; and as this space is designed for the accommodation of twenty-eight patients, each patient will have more than 2,000 cubic feet of air to his own share, irrespective of change by ventilation. But the arrangements for warming and ventilation are also very complete and admirable. The entire building is, in the first instance, warmed to a certain extent by pipes which receive supplies of hot water from large boilers fixed in the basements of each block of building. These heating pipes are expanded into broad radiating coils here and there where immediate increase of warmth is desired. There are two of these radiating coils to each ward. But in addition to these, there are also in each three *open fire-places* situated in the central line of the floor, and sending circular iron chimneys or flues up through the ceiling. These columnar iron chimneys are, however, double. Each has an inner central pipe, and an outer investing sheath. The inner pipe carries up the smoke of the burning fuel; the outer case collects all the effete and used-up air of the chamber, and discharges it with the smoke at the outer orifice above the roof, the central heated pipe being an efficient cause of a steady up-cast. The final outflow of both smoke and impure air is by the square turrets, which are seen from the outside as a part of the ornamental finish of the roof. The fresh air is brought from the outer wall beneath the floors, and is discharged into the wards *through the heated casings* of the fire stoves and radiating coils. This double plan of warming, partly by radiating hot pipes, and partly by open fire places, is the very perfection of efficiency and comfort. Private residences in England are almost always uncomfortable in very cold weather, however liberal may be the consumption of fuel, because the larger and brisker the fires, the more intolerable are the indrafts of cold air. The cylindrical smoke pipes run straight up from basement to roof through the entire series of floors, so that when the flues require cleansing, a kind of plug is removed from the bottom of the pipe, and the entire accumulation of soot is brought down at once into one of the cellars of the basement, without causing any interference with the comfort or cleanliness of the several wards above.

There are nurses' chambers on either side of the entrance of each large ward; and at each side of the farther end corresponding turrets, or corner rooms, containing lavatories and baths on one side, and closets on the other with convenient little shoots, which are to convey the dust of sweepings and the soiled linen of the patients down at once to the offices in the basements. Near the nurses' chambers there is also a large square lift, worked by hydraulic power, to be used in conveying patients and supplies of all kinds, up and down between the projecting corners, or turrets (at *b b* on the plan). At the further extremity there is a most delicious open-air balcony looking over the cheerful river, with ready access to it from the windows of the wards.

Block No. 9, being designed for the reception of infectious and contagious diseases, is differently planned. There are smaller wards on each side opening from a central stair-case and landing. Between the Blocks 2, 3, and 4, and between 6, 7, and 8 (at *a*, *a*, on the plan) are low buildings rising in broken and ornamental form from the general line of the connecting corridor, which will be used for the residence of officers of the establishment. Connected with the upper part of these, there is a fine surgeons' operating theatre at each side of the building, one for males and the other for females. These are entered from the light and airy glazed corridor of the second floor, and have retiring-rooms for patient and surgeon, and a direct way to a pleasant open-air flat roof looking out over the river.

In communication with the great connecting corridor there is a perfect maze of offices and conveniences, approached by an accident-receiving porch abutting on the Lambeth Road. There are receiving-rooms for out-patients and for surgical cases and accidents, dispensaries, and a long range of small private rooms for the medical and surgical officers, clerks, and dressers. The Administrative Block, No. 1, is entered from the Westminster Bridge Road by two flights of steps, one leading to the private residence of the Treasurer of the Hospital, and the other to a large Council hall looking out by a balcony upon the river, and to Committee rooms and other offices, which are to be connected with the other departments of the establishment by lines of electric telegraph. The general entrance of the Hospital is from the Lambeth Road, leading to a spacious hall in the central block, No. 5, above which is the Chapel of the Hospital, a vaulted building of fine proportions and very chaste design. This block will be finished towards the river front, where it is set back or recessed from the line of the other blocks, by an ornamented face which looks out on an enclosed space or central court. From this court the prospect to the river is between the pillars of an open colonnade, bearing in the centre a group of sculptured figures, of which the chief will be the statue of Edward the Sixth, the royal founder of the Hospital.

Block No. 9 has much more the appearance of a church, or chapel, than the central building. It is of low elevation, compared with the other blocks, and has ornamental arched windows of large size; and at the corner there is a square tower, half steeple, half pagoda, which

* See plan in NATURE No. 63, p. 202.