PHYSIOLOGY OF GASTRIC DIGESTION.

THE foundations of our knowledge of the physiology of gastric digestion were undoubtedly laid by the careful study of the historical case of gastric fistula by Dr. Beaumont — the case of Alexis St. Martin. Animal experimentation and the test-tube reactions of the laboratory cannot be compared in accuracy to observations made directly upon the living human organism, when these rare opportunities arise which permit of such a study. Then, too, it may happen that a considerable rectification of current physiological doctrine has to be made, and the laboriously gathered results of many observers have to be replaced by those made upon a single case. Much depends, then, upon the skill and thoroughness with which the study of the processes in the human subject are undertaken.

It must be admitted that these qualities are conspicuous in the recently published records of a study of the chemical processes of the small intestine by Drs. McFadden, Nencki, and Sieber. The subject of their researches, says *Lancet*, was a female patient under the care of Professor Kocher, in whom an intestinal fistula had resulted from excision of a portion of gangrenous intestine due to strangulated hernia. The false anus was situated in the ileum just above the ileo-cæcal valve, so that the materials escaping thereby were wholly composed of the chyme which had passed through the whole length of the small intestine. For a period of nearly six months the woman lived under these conditions, permitting of a long series of observations relative to the time and character of intestinal digestion under varying forms of diet, etc. At the end of that time Professor Kocher re-established the natural channel by means of an operation which proved perfectly successful. It may be remarked at once that during the whole period when there was practically no large intestine the patient gained in weight, and, as the urinary analysis showed, eliminated a fairly normal quantity of urea.

The procedure consisted in adapting a flexible tube to the fistulous outlet, so as to collect all the material that escaped, and to note its characters under varying circumstances. In consistency this "chyme"— if it may be so termed — was more fluid and diarrhœal when the diet was albuminous than when it was mainly of a vegetable nature. It was seen that the flow of chyme from the small into the large intestine is steadily continuous, being least marked during the night, owing to no food being then taken; and by some ingenious experiments (e.g., the addition of hard beans to the food, or of salol, which allowed of the detection of salycylic acid in the matters escaping) it was shown that the passage of foods from mouth to cæcum occupies at the least two hours: but all traces of the substances introduced did not disappear for from nine to fourteen or even twenty-three hours. The rate of flow, of course, bears much relation to the consistency of the intestinal contents. As regards the nature and properties of the evacuated materials, it is noticeable that they were almost free from odor, containing hardly any products of albuminous disintegration, such as indol and sulphuretted hydrogen; they were slightly acid in reaction, tinged yellow by bilirubin, and, according to the predominance of flesh or starchy matter in the food, showed muscle fibre, albuminous granules, vegetable fibres, starch granules, etc., and invariably a large number of various forms of bacteria. The filtrate yielded albumen, mucin, peptone, dextrose, the two forms of lactic acid, acetic acid, and the biliary acids and bilirubin.

The authors enter very fully into the characters of the bacteria they find, many forms being special to the small intestine, others existing also in the mouth; but, passing over these, which would entail a full description to be intelligible, we may glance at the main results of their researches, which somewhat modify accepted physiological teachings. One point of interest is the fact that albumen is hardly, if at all, decomposed in the small intestine. Even the action of the tyrosin of the pancreatic juice is small, for leucin and tyrosin were not to be found. Probably, in health, albuminous disintegration takes place chiefly in the large intestine, and it is only in disease that it occurs in the stomach or small intestine. Amongst the products of such decomposition are iodol, skatol, phenol, sulphuretted hydrogen, carbonic acid, methylmercaptan, etc., all of which may be regained from the large intestine. The bacteria of the small intestine are concerned in the disintegration of the carbo-hydrates into lactic, acetic, and succinic acids, and also into ethylic alcohol. The authors, in noting this last-named fact, cannot avoid a thrust at the total abstainers. It is generally believed that the chyme is rendered alkaline by the secretien of the small intestine, but they find that, owing probably to the reinforcement of gastric acidity by the organic acid resulting from sugar, the total quantity of acid is more than can be neutralized by the bile, pancreatic, and intestinal juices. If, however, the alkalinity of these fluids be diminished, the intestinal contents are hyper-acid, and mucin is precipitated instead of being intermingled with the chyme. This explained the diarrhœal quality of the evacuations noted to be associated with a large amount of sugar and organic acid in the chyme. On the other hand, an excess of alkalinity favors putrefactive decomposition, the acids apparently holding in check the bacteria concerned in albuminous disintegration. A marked contrast in this respect was exhibited between the small and large intestine. Putrefactive bacteria could hardly be at all isolated from the former, whilst they abounded in the latter; but this is not owing to the influence of bile, which Nencki showed to have no real antiseptic property.

The part played by bacteria in intestinal digestion is limited probably to the fermentation of sugar and carbo hydrates generally, the excess of acid resulting from this fermentation being neutralized by the alkaline intestinal juice. But, much as bacterial life abounds in the intestinal canals, varying according to the kind and quality of the ingesta, it does not appear that the processes initiated by these organisms are of such value or importance in nutrition as the chemical ferments. Certainly the patient who was the subject of these observations gained in flesh, although for six months she was deprived of all the bacterial processes that go on in the large intestine.

OCEAN CURRENTS AND TEMPERATURES IN EAST ASIATIC WATERS.

UNDER this title Dr. Gerhard Schott contributes to a recent number (ix.) of *Petermann's Mitteilungen* an interesting paper, which contains new information regarding the course of the Kuro-Shiwo and other currents in Chinese waters, and also as to ocean temperatures. The conclusions arrived at by the author are based upon researches made by him among the archives — principally ships' journals — of the German Admiralty, which contain observations of great value to science. With regard to the Kuro-Shiwo, the general result of Dr. Schott's researches, says the Proceedings of the Royal Geographical Society, is that this great ocean current is not so extensive as hitherto supposed. Throughout the whole of the year the warm stream is confined as a constant current exclusively to the west side of the line of islands,

Meiaco shima, Lu-Chu, and Linschoten, while the sea to the east, although showing at times displacements to the north-east, is otherwise quite motionless. The supposed constant current of considerable velocity just east of the Lu-Chu Islands does not exist. The Kuro-Shiwo, in the northern part of its course, shows more tendency to break through the island barrier to the east. Its principal outlets in this direction are the Colnet Straits (30° north latitude) and the Van Diemen Straits (31° north latitude). From this point to the meridian of the Kii Channel the current reaches its greatest extent, and flows pretty close to the land in a north-east direction, with a striking bend, under 135° east longitude, to the south-east, resuming as it flows at some distance from the coast up to Yokohama its old north-east direction.

Under the 38th parallel east of Cape Kinkuasan, the Kuro-Shiwo strikes the Oga-Shiwo, i.e., the cold Kurile current from the north. The observations of ships in this region show that often in a few hours the temperature of the water falls 20° and 30°, and the temperature of the air also; the weather becomes cold, muggy, and rainy, and the color of the water changes from the blue or blue-black of the tropics to the well-known bottle green. The boundary line between the Kuro-Shiwo and the Oga-Shiwo, from February to April inclusive, is under 38° latitude and 143° to 145° longitude; in May, under 42° and 147°; in July, under 45° and 150°; and in August, lies north of 50° latitude. The polar current here does not extend at any time below 38°. The analogy between the Pacific and Atlantic in this respect is almost complete. The Oga-Shiwo is the Pacific Labrador current, and Cape Kinkuasan plays the part of Cape Race, except that the latter lies 10° further north than Cape Kinkuasan. After meeting the polar stream, the Kuro-Shiwo turns east, but Dr. Schott does not follow it in its further course. Running parallel and to the east of the Kuro-Shiwo is a second though less important warm stream, called the Bonin current, which comes from the south and flows in a north, north-east, and then east-north-east direction. At 130° east longitude it flows east in a course which former maps showed as the course of the Kuro-Shiwo. The Bonin current does not always flow to the west of the Bonin Islands; its mean axis of movement varies with the season of the year, and at the end of summer lies to the east of the Bonin Islands. In this case also there is an analogy with the phenomena of the North Atlantic, as Krümmel's investigations have showed that east of the Antilles and of the Florida current there flows a broad though not intensive stream in a similar direction. Dr. Schott discusses the influence of the winds upon these currents, and gives some important information with regard to currents in the Straits of Formosa and the Yellow and Japan seas. The second part of his article is devoted to water temperatures in these regions.

THE BOURBONS AND ARCHÆOLOGICAL REMAINS.

IT would naturally have been thought that the Restoration would have made it a special care to restore and preserve the monuments of the past, but it is a remarkable fact that this epoch was the commencement of a system of almost limitless destruction of the edifices which the Revolution had spared, and that the change of dynasty in 1830 has certainly been productive of benefit in this respect at least. In the time of Napoleon the Minister of the Interior, by his circular of June 4, 1810, proposed a long series of interrogatories to all the prefects relative to the actual condition of the old castles and abbeys in their respective departments. These documents are replete with curious and interesting facts. Under the Restoration, M. Simeon, when Minister of the Interior, adopted a similar measure, but it does not appear that any practical results were obtained. The lamentable system of indifference which prevailed on this subject up to 1830, says a writer in *The Architect*, may be inferred from the terms of that ordinance which can never be sufficiently regretted, by which the splendid depôt of historical monuments formed at the Petits Augustins was destroyed and dispersed under the pretext of making restitution to owners who no longer survived, or who did not know what use to make of the objects so restored to them. It is believed that not one of the monuments given back to individual owners has been preserved; and, notwithstanding the notorious difficulty of disposing of these splendid relics, a steady refusal was constantly returned to the reiterated requests of M. Lenoir, the founder of this unique museum, to re-establish his collection with what remained after restitution had been made to every known proprietor. This contempt for and unpardonable neglect of antiquity in a Government whose chief claim to respect was derived from the principle of antiquity, extended even to the Conservatoire de Musique; the curious collection of ancient instruments of music which had been formed there was ordered to be dispersed or sold at a low price. This ruinous system, which prevailed in Paris, was practised on a still more extensive scale in the provinces. It would scarcely be believed that, under a moral and religious government, the Corporation of Angers, which had for its chief a deputy of the extremest ultra-loyal opinions, should have been allowed to convert the Gothic Church of St. Peter into a theatre. It is still more incredible, but not the less true, that the Church of of St. Cesaire at Arles, which the most erudite antiquaries looked upon as one of the oldest in France, was transformed *en mauvais lieu*, without any public functionary protesting against such profanation. Who would think that no effort was made, when the Most Christian King returned to the throne of his fathers, to rescue the magnificent papal palace at Avignon from its military desecration? And who could credit the fact that at Clairvaux, in that celebrated sanctuary which was directly connected with the authority of the State, the exquisite church, so beautiful in its proportions and so complete in its grandeur, which dated from the twelfth century, and was said to equal Nôtre Dame, at Paris, in size, which was begun by St. Bernard, where so many queens, princes, and pious generations of monks were entombed, and where the heart of Isabella, the daughter of St. Louis, was deposited, that this edifice, which had survived the havoc of the Revolution, and the indifference of the Empire, should have been demolished in the very first year of the Bourbon restoration? It was then razed to the ground, with all its projecting chapels, without leaving one stone upon another, or even sparing St. Bernard's tomb, to make room for a square surrounded by trees in the centre of the prison which occupied the site of the venerable monastery. Before leaving Clairvaux, we may as well mention that a prefect of the department of Aube, under the Restoration, actually sold seven hundred pounds weight of the archives of this famous religious house, and which were removed to Troyes; and the Count de Montalembert stated that, when he was at that place, he walked over a heap of parchments strewed thickly on the floor, from which he picked up a bull of Pope Urban IV., the son of a shoemaker of that very city of Troyes, and probably one of its most illustrious children. The same prefect demolished the relics of the palace of the ancient counts of Champagne, of the noble and poetic dynasty of the Thiebauds and Henri-le-Large, because they were in the line of a crescent which his architectural genius had unfortunately devised. The beautiful gate of St. Jacques (constructed in the time of Francis I.) and that of Beffroy suffered the same fate. Another prefect of the Restoration, in the department of Eure and Loire, had no scruple in appropriating to his own use several painted windows of the Cathedral of Chartres to decorate the private chapel of his country mansion. It has been incontrovertibly proved that during the fifteen years of the Restoration more irremediable devastations were committed in France than in the period from 1789 to 1813. This destruction was certainly not enjoined by the Government, but it was done under its eyes, with its tolerance, and without exciting the slightest marks of its solicitude.

ANTIQUARIAN DISCOVERIES NEAR ALEXANDRIA.

IN the London *Times* of Oct. 12 appeared a telegraphic announcement of the late interesting antiquarian discoveries at Abukir, distant thirteen and a half miles by rail eastward from Alexandria.

Excavations are being continued under the direction of Daninos Pasha, a savant well qualified for the work, to whom is due the merit of the discoveries; and if Government will supply the funds necessary to enable him to continue his researches, there are abundant indications that valuable "finds" will be made in a locality