The appearance and consequent value of the fibre depends mainly upon the care taken in drying it, as should it be exposed to rain and not completely dried, it becomes discolored, assumes a brownish tint, and loses its strength to a considerable extent. The outside layer produces a reddish-colored fibre, which is quite sound, and easily distinguishable from spoiled hemp, but fetches a lower price in the market.

The cost of preparing and planting a *quinon* (about seven acres), and keeping it clean up to the time of the first crop, is estimated at from two to three hundred dollars, not including the first cost of the land; and afterwards an annual outlay of about sixty dollars would be required to keep the soil free from weeds, etc. The extent of land mentioned, after the plantation is three years old, would produce from sixteen to twenty bales per annum, according to the quality of the soil.

Almost without exception, landowners who devote themselves to the production of hemp in the Philippine Islands are European Spaniards, or natives of the islands, and a foreigner would have considerable difficulty in establishing himself, and would meet with many obstacles before he found himself in touch with his surroundings. Foreigners can only own land in the Philippine Islands under the following conditions, which are strictly enforced: (1) That they reside in the Philippine Islands, and are duly registered in the books of their respective consulates and of the government. (2) That their lands be sold, should they leave the islands and establish their domicile elsewhere. (3) That, in the event of the death of a landed proprietor, his heirs be compelled to reside within the territory of the Philippine Islands, or sell the property. The acquisition of land by foreign companies or associations is absolutely prohibited.

The cost of native labor is about twenty or twenty-five cents a day; but the principle upon which the hemp plantations are worked is, that the laborer gets one half of the result of his work, the other half going to the proprietor. A laborer, under pressure, can clean about twenty pounds of hemp per day; but, as a rule, the quantity cleaned by one man, working steadily day by day, averages about twelve pounds. Many unsuccessful attempts have been made to improve upon the primitive knife and board, which are, up to the present, the only means used for cleaning the fibre. The great faults of the new inventions have been the weight of the machine, and the additional liability to break the fibre. A necessary requirement for any new machine which would replace the present method is, that it should be light enough to be easily carried about by the workmen from place to place on the plantation. The exports of hemp from the Philippine Islands, in 1890, amounted to 63,270 tons, which, at the average price for the year, realized about ten and a half million dollars.

## THE ELECTROLYSIS OF ANIMAL TISSUES.

THE first number of "Studies from a Physiological Laboratory, Owen's College, Manchester," contains a paper by G. N. Stewart, which is an interesting contribution to our limited knowledge of the action of electricity in relation to animal tissues. From an abstract of this paper, which we find in a recent number of the London *Electrical Review*, it seems that practically the whole of the conduction in animal tissues is electrolytic, and the electrolytes are principally the mineral salts, changes in the proteids being produced by secondary electrolytic actions.

In simple proteid solutions, conduction occurs with great difficulty if mineral salts are absent, or if they are present only in small proportions. The effects on the proteids themselves in saline solutions vary somewhat with the current density. Alkali-albumin is formed at the cathode, and acid-albumin at the anode; while in solutions of coagulable proteids there is also coagulation at the latter pole. With a strong current, the proportion of coagulated proteid to acid-albumin is greater than with a weak current. In bile and urine it was observed that the conduction is also chiefly due to electrolysis in the mineral substances, and not in the organic substances contained in these secretions. In blood, the changes which take place in the proteids are similar to those which are mentioned above. There is also a formation of acid-hæmatine (mixed with or preceded by methæmoglobine with certain strengths of current) and of alkali-hæmatine at the anode and cathode, respectively. There is no evidence that hæmoglobine or any of its derivatives can act as an ion.

In muscle the nuclei become apparent and the sarcous substance granular at the anode; this is the appearance always produced by a weak acid. At the cathode the fibres become more homogeneous. The chief chemical changes in proteids are, an increase in the neutralization precipitate of the aqueous extract, and a corresponding decrease of the globuline. At the anode the neutralization precipitate is increased, but the amount of globuline is more than correspondingly diminished, because part of this proteid is coagulated. The effects of electrolysis on the salts of the muscles were studied by estimating the ash. Striking changes were found to occur, which, if produced within the living body, would profoundly modify nutrition. The antiseptic action of the current was studied in the case of micro-organisms, and it was found to occur chiefly, if not entirely, around the anode.

In another and later paper specially devoted to the electrolysis and putrefaction of bile, Mr Stewart shows that when bile is electrolyzed in a U tube, changes take place at the negative pole, which are similar to those which occur when bile is allowed to putrefy; that is, the pigment changes to brown through light shades, ultimately becoming yellow. In the early stages of the electrolysis a reversal of the current restores the original color. The anode has an oxidizing, the cathode a reducing, action upon bile. The bile salts are electrolytes, and an acid constituent of these crystallizes at the anode in long needles; but the conductivity of bile salts is small as compared with that of the inorganic constituents of the secretion.

With these results for bile we may compare those obtained by J. B. Haycraft and H. Scofield (Zeit. Physiol. Chem., xiv., 193). In the course of their researches they showed that a play of colors is obtained at the positive pole of a battery (four Grove cells) placed in the bile, indicating successive stages of oxidization: if the negative pole be then placed in the bile, the effects are reversed, indicating reduction.

Mr. Stewart makes some attempt to connect this knowledge of the electrolysis of animal tissues with the application of electrolysis in surgery, and promises a further communication on the physiological aspects of the question.

## LETTERS TO THE EDITOR.

**** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

*On request, twenty copies of the number containing his communication will be furnished free to any correspondent.*

### Osteological Notes.

IN my notes published in *Science*, Vol XVI., p. 332, upon the significance of the jugal arch, I stated that although this arch is often composed of three bones, this number was sometimes reduced to two, and in some cases rendered still more rudimentary, but that in no case could the arch be said to be absolutely wanting. Moreover, that the number of bones present, as well as the strength of the arch, depended upon the extent of surface, and upon the amount and form of curvature, and these, in turn, upon the advanced or receded position of the orbit, as also upon that of the articulation of the mandible, whether above, below, or upon a level with the orbital cavity. These also are correlated with the extent of surface presented by the ascending process of the lower jaw with the adjoining crests, processes, fossæ, with the dental series, and necessarily with the muscles of mastication.

I cited the *Carnivora* as presenting the most instructive example of the various points to be considered in connection with the morphology of the arch, every one of these having reference to enormous development and implying great strength and capacity.

I also cited certain of the *Edentata* as exhibiting the exactly opposite condition, —a rudimentary and incomplete arch, with consequent feeble muscular power, no necessity for mastication, and an entire absence of teeth.