

The offspring (soboles) are derived from Norwegian statistics of the number of children born to married and unmarried women of the several ages, such facts for England not being available.

As the Life Table represents a population, continuing the same in constitution from year to year, the columns *sy*, *s'y*, and *s''y*, show the *annual* number of children born to women of the several ages and classes; and the total births of live-born children in a year are 1,450,910, of which 55,381 are of illegitimate children.

By means of simple formulæ, the number of children born in or out of wedlock, to any given number of women at a specified age, can be deduced. 1,000 wives aged 20 bear 401 children, while 1,000 unmarried women of this age bear 11 children; at age 30, 1,000 women of each class bear 337 and 29 children; at age 40, 210 and 10 children respectively are born of married and unmarried women.

II. "A Note on Protagon." By ARTHUR GAMGEE, M.D., F.R.S.,
Brackenbury Professor of Physiology in Owens College,
Manchester. Received January 19, 1880.

In 1879, in conjunction with Dr. Ernst Blankenhorn, I communicated to the Royal Society a paper entitled "On the Existence of Liebreich's Protagon in the Brain."*

In that paper we sought to establish the existence of the body which had been described by Dr. Liebreich, but which had by several writers been considered to be a mixture of lecithin and cerebrin. We gave many analyses of several samples of protagon, and pointed out the constancy in the composition of the body when subjected to repeated crystallization from alcohol. I have since the date of the above paper, in conjunction with Herr Adolf Spiegel and Mr. Leopold Larmuth, continued my examination of protagon, and of certain bodies which accompany it. Our researches, which are not yet in a sufficiently advanced state for publication, have in the fullest degree confirmed the conclusions arrived at by the research of which the results have already been submitted to the Society.

The object of the present communication is to notice certain of the statements which have lately been published by J. L. W. Thudichum, M.D.,† to the effect that protagon is an impure body consisting of a mixture of many organic substances, and containing in particular considerable quantities of potassium.

"These inquiries," says Dr. Thudichum, referring to his own re-

* "Proc. Roy. Soc.," vol. xxix, p. 151.

† "Note and Experiments on the Alleged Existence in the Brain of a Body termed 'Protagon'." "Annals of Chemical Medicine." By J. L. W. Thudichum, M.D. London, 1879. Page 254.

searches, "were already several years ago extended to the product termed 'protagon'; and this, too, was found to contain inorganic constituents irremovable by recrystallization from alcohol, however frequently repeated. It was found more particularly that 'protagon' and the bodies into which it can be separated, according to my researches, always retain considerable quantities of *potassium* in combination. As the quantity of inorganic ingredients in 'protagon' had never been estimated, I prepared a specimen of this matter, and on analysis found it to contain the better part of 1 per cent. of inorganic incombustible matter, phosphoric acid not included, and in this no less than 0.76 per cent. of the 'protagon' of *potassium*."*

Having described various experiments in which the above impure body is supposed to have been resolved into bodies which Dr. Thudichum has elsewhere described as proximate principles of the brain, he proceeds: "The foregoing data enable us to attribute their proper value to the series of operations by which the advocates of 'protagon' have brought about the concordance of their analyses. The potassium, which, though present in such quantity that if 'protagon' were a unitary body its atomic weight would thereby be fixed, they have not found, is calculated as oxygen; the phosphate of lime which they have not extracted, is made to increase the protagonal phosphorus; the mixture of the myelins, which they have not extracted, and which they are unable to diagnose, is adjusted by solvents to a convenient quantity, and made to represent the constituent phosphorus of protagon The uniform chemical composition of the brain greatly favours the obtaining from it, by the aid of processes nearly akin to trimming, of extracts of uniform composition; this uniformity can be greatly aided by limitations of the quantities of materials operated upon, and of the quantities and strengths of the solvents; and by careful observance of these limitations, preparations are obtained which present a delusive appearance of definiteness. But this delusion could only be persevered in by persons who are not in the habit of subjecting their products to tests of purity, and who are not acquainted with the necessity, which is imposed upon every conscientious inquirer, of questioning his products and conclusions in a sense adverse to his hypotheses."

After reading the above remarks, I determined upon placing in the

* The words printed in italics leave some doubt as to the author's meaning. It might be supposed that by "0.76 per cent. of the 'protagon' of potassium" he did not mean 0.76 per cent. of potassium, but much smaller quantities. Lest there should be any doubt on this point it is necessary to quote the following passage, in which the statement is repeated in plainer terms:—"The remaining 30 grms. of protagon once recrystallised (product N 1.2) contained 1.057 per cent. of phosphorus and 0.76 per cent. of potassium." It therefore appears that in the sentence quoted in the text the author means that the potassium amounted to 0.76 per cent. of the protagon.

hands of my friend and colleague, Professor Roscoe, F.R.S., the only sample available of the protagon of which the analyses had been communicated to the Royal Society; this was a twice re-crystallized sample of protagon from ox-brain, which had been employed for analyses 3 and 4. The remaining specimens had been used in experiments on the products of decomposition of protagon.

I requested Dr. Roscoe, to whom I communicated Dr. Thudichum's criticism, to determine the amount of mineral impurities, and especially of potassium present in protagon. He has kindly furnished me with the ensuing report, with which I shall close this communication, as I am convinced that no one will expect me to enter into a polemical discussion with the author of the previously quoted matter.

The Owens College, Manchester,

December, 1879.

I have examined spectroscopically for potash a sample of protagon furnished me by Dr. Gamgee, and labelled "Protagon twice re-crystallized. Blankenhorn." I could not detect any potash by the spectroscope in the incinerated mass from 0.1 grm. of substance. With the carbonized mass obtained from 1.0 grm. of substance I obtained the potassium line (α) very faintly, and from comparative experiments with a dilute solution of a potassium salt, I estimate the quantity of potash in 1 grm. of the substance not to exceed $\frac{1}{10}$ mgrm. The carbonized residue of 1 grm. of protagon was carefully oxidized with pure nitric acid, when a small quantity of fused metaphosphoric acid remained after ignition. This residue weighed 0.0278 grm., corresponding to 1.08 per cent. of phosphorus.*

(Signed) H. E. ROSCOE.

III. "On the Induction of Electric Currents in Infinite Plates and Spherical Shells." By C. NIVEN, M.A., Professor of Mathematics in Queen's College, Cork. Communicated by J. W. L. GLAISHER, M.A., F.R.S. Received January 21, 1880.

(Abstract.)

The object of the present paper is to determine the currents which are induced in an infinite plate of uniform conductivity and finite thickness, and in a sphere or spherical shell of any thickness when in the presence of a varying magnetic system: and in any of these bodies when rotating near a constant magnetic system, round an axis which is normal to the faces of the plate or passes through the centre

* The mean quantity of phosphorus found by Gamgee and Blankenhorn was 1.068 per cent.—A. G.