various museum activities, the original source of wealth and many other unknown facts; but it may be assumed that the data, even though obtained by questionnaire, give a fairly reliable picture of average conditions.

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BLOOD PRESSURE OF TYPHOID CARRIERS

IT has been known for years that typhoid carriers are very likely to exhibit signs and symptoms of gall bladder disease. Carriers submitting to cholecystectomy, whether because of clinical symptoms or to protect the public health, almost invariably have cholecystitis and, if the infection has been of long standing, cholelithiasis.

It has recently been found in Michigan that a chronic typhoid carrier of long standing is more likely to have hypertension than a person of the same age in the general population. The arbitrary limit of normal systolic blood pressures is frequently placed at 140 mm, and in Symonds's tables[1] the mean systolic pressure even for those over 60 is but 135.2 mm, if the 5.7 per cent. who had systolic pressures above 140 mm are excluded. On the other hand, of 40 carriers of long and short standing, 55 per cent. had a systolic pressure above 140 mm, the mean systolic pressure of the group being 155 mm. An elderly group of 27 persons in a county home, many of whom had arterio-sclerosis, had a mean systolic pressure of but 145 mm, whereas 27 carriers with the same mean age had an average pressure of 175 mm. In the 11 carriers who had had typhoid fever before 1911, the lowest systolic pressure was 158 mm and the mean 197 mm.

We are not prepared to evaluate as yet the relative importance of age and the age at which the person becomes a carrier, nor has our experience been great enough to draw any conclusion as to relative longevity. If our observations are representative, it would seem that a typhoid carrier does not have as great a life expectancy as a person of the same age in the general population.

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THE SPECTRUM OF DEUTERIUM?

IN a paper in *The Astrophysical Journal* of July, 1918 (Vol. xlviii, p. 10), entitled "The Astronomical Atom and the Spectral Series of Hydrogen," the present writer undertook to calculate the value of the nuclear charge of the hydrogen atom from the wavelengths of the lines in its different spectral series. From these computations he concluded that the "principal series" of hydrogen must be due to an atom having twice the nuclear charge of the atom of the Balmer series. He says:

> It would seem that it must be possible to have a hydrogen atom with a nuclear charge of $2e$. Such an atom should give off radiation of higher frequency than one with a charge only half as great, and its spectrum should be looked for in the ultra-violet.

In SCIENCE of July 13, 1934 (p. 23), Lord Rutherford says that double weight hydrogen has been prepared of such purity that the Balmer lines are not visible in its spectrum, but does not mention the lines of the principal series.

FERNANDO SANFORD

PALO ALTO, CALIF.

BERL ON NATURAL OIL

IN a recent number of SCIENCE[1] appeared an article by E. Berl, of the Carnegie Institute of Technology, entitled "Origin of Asphalts, Oil, Natural Gas and Bituminous Coal." The present writer is concerned meanwhile only with the short closing paragraph of the article. There one reads: "The so-called animal theory, which explains the formation of oil by the heat decomposition of fish, and the lignin theory, which assumes that bituminous coals are derivatives of lignin, can not be substantiated by experiments."

To any one at all familiar with the history of petroleum and its possible primary origin, alike on a colossal scale in nature, and on a small scale experimentally, the first part of the above assertion betrays a serious ignorance on the part of its author. For it should be known to all who have given any attention to the subject that the two eminent investigators, Professors Warren and Storer, published in 1867[2] a striking and suggestive paper, which has been too much neglected in recent years by investigators.

A condensed account of their experiments was published by the present writer some years ago,[3] and reads as follows: "We owe the first exact and definite proof that fish oil can be converted into secondary products like those of petroleum and its derivatives, to the careful researches of Warren and Storer. To some prepared milk of lime they added a quantity of commercial menhaden oil in a wooden tub, at the bottom of which was a coil of perforated pipe that introduced steam. Saponification was effected in a few hours, and the saponified mass was dried. It was then strongly heated with hydrate of lime in a retort, when

[1] *Jour. Am. Med. Assn.*, 80: 232, 1923.

[1] September 7, 1934, page 227.

[2] Amer. Acad. Arts and Sc., Memoirs," S2, 9, page 177, 1867.

[3] "Fishes the Source of Petroleum," page 21, Macmillan Company, 1923.

distillation proceeded quietly and regularly. The distillate consisted of 'a mixture of hydrocarbon oils, of a dark brown color, and a peculiar disagreeable odor.' In consistency, 'this mixture did not differ much from the crude coal-oil which is obtained by distilling rich cannel coals.'

"'The crude hydrocarbon oil was rectified by first distilling it in a slow current of steam, then treating the distillate successively with oil of vitriol and a solution of caustic soda in the usual way, and again distilling in steam as before. The refined product so closely resembled refined coal-oil and petroleum in odor, color, and illuminating properties, that it could hardly be distinguished from these.'

"The crude oil thus secured was distilled, and a naphtha, 'a mobile liquid of light, lemon yellow color, and peculiarly nauseous odor,' was obtained. From this in turn, on repeated distillation, a series of sixteen bodies with definite but different boiling points and specific gravities, separated out. These included benzol, toluol, xylol and other now well-known hydrocarbons, that are derived from destructive distillation of crude petroleum. They further were able to compare these results with a similar series secured from like study of Rangoon petroleum.

"Warren and Storer therefore deserve fullest credit for thus blazing the way in a skilful manner, toward a true explanation of the evolution of many hydrocarbon products from their primitive source, namely fish-oil."

The present writer would now ask Mr. Berl: "Does he, or does he not, consider that the above experimenters carried out the series of experiments as described, and if so does he accept their results as explaining in a satisfactory manner the possible origin of petroleum and numerous related chemical bodies from "the heat decomposition of fish"?

But many years after publication of their results, Engler experimented with the same fish-oil and concluded that such is capable of yielding large supplies of petroleum. Still more recently investigators in this and other countries have shown that production of petroleum from fishes can "be substantiated by experiments." The present writer then fully accepts and defends the correctness of his aphorism, "Fishes the Source of Petroleum." For unless Berl or others can prove that the colossal supplies of free oil already utilized, shamefully wasted or still in natural storage can be clearly traced to some other and natural source, he is compelled to adhere to the truth of the above aphorism.

JOHN MUIRHEAD MACFARLANE

SOCIETIES AND MEETINGS

THE SECOND ALL-SOVIET MATHEMATICAL CONGRESS

FROM June 24 to 30, 1934, there took place in Leningrad the second All-Soviet Mathematical Congress, the first of which was held in Kharkov (Ukraine) in 1930. The sessions met in the buildings of the Academy of Sciences of the U.S.S.R. and of the University of Leningrad. This is an imposing and historical group on the right bank of the Neva facing the center of earlier court and administrative activities (Winter Palace, Admiralty, St. Isaac's Cathedral) on the other bank. There were nearly six hundred delegates from all institutions of learning of the U.S.S.R., but the undersigned was the only non-Soviet participant. Some 230 papers were presented in the nine sections (algebra and number theory, geometry, topology, analysis (2), mathematical physics, probabilities, approximations, history and philosophy of mathematics) and, in the plenary sessions, the following addresses were given by invitation:

I. M. Vinogradof, "Waring's Problem."
P. S. Alexandrov, "The Relations between Algebra and Topology."
V. I. Smirnov, "Certain Contributions of the Leningrad School in Analysis and its Applications."
A. O. Gelfond, "The Theory of Transcendental Numbers."
N. G. Tchebotarev, "Certain Problems of the Modern Galois Theory."
V. V. Stepanov, "Quantitative Methods in the Theory of Differential Equations."
L. A. Lusternik and L. G. Schnirelmann (presented by the former), "Topological Methods as Applied to Problems of Extremals."
L. S. Pontrjagin, "Structure of Continuous Groups."
M. A. Lavrentiev, "Geometrical Questions in the Theory of Functions of Complex Variables."
N. M. Gunther, "Stieltjes Integrals in Mathematical Physics and in the Theory of Integral Equations."
I. M. Muntz, "Functional Methods in Boundary Problems."
S. Lefschetz, "Algebraic Geometry: Its Methods, Problems and Tendencies."
A. N. Kolmogorov, "Certain New Tendencies in the Theory of Probabilities."
I. A. Kibell, "Mechanics of Compressible Fluids."

The general level of papers presented and lectures given was of the highest. The formal lectures were attended by hundreds of auditors, even though several were usually given simultaneously, owing to shortage of time. One day was devoted to a discussion of