Fossil Nut-shells of *Juglans Sieboldiana*, Maximovicz
in the Lignite of Asahiyama, near Nagano
City, Province of Shinano,

(continued).

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Comparing the above mentioned fossil nut-shells of *Juglans* with those of the living *J. sieboldiana* Maxim.,⁽¹⁾ of the large type, the present writer, so far as he examined the external forms and characters of the cavity, cannot detect in the former any features which would, in a strict sense, differ from the latter, except the small size of the former.⁽¹⁾ Mr. Kryshstofovich seems to be somewhat inclined to lay some stress upon the small size of the fossil nuts and to connect it with the climatic conditions of the past. However, the shrinkage during the alteration of the nut-shell in the lignite bed is of special importance in such a speculation. But, at present nothing is clearly known about the real processes, making lignite from the fresh vegetable matter. The most important ones, however, are bio-chemical and dynamo-chemical.⁽²⁾ In this case, no particular effect of the biochemical process upon the size and form of the nut-shells can be observed. Thus, neglecting the bio-chemical process, the products of charcoal from living plants⁽³⁾ may roughly be compared with the formation

1) Here must be mentioned the Ainu name for this species, which is the sole representative of *Juglans* in the Hokkaidō, Japan. The Hokkaidō Ainu are a remarkable people, with a vocabulary rich in plant names. For instance, the genus *Salix* is subdivided with special names for more than ten different forms. But special names to distinguish different kinds of the ordinary *J. sieboldiana* of the Hokkaidō (in Ainu, "Neshiko-ni" or "Ninum-ni") are not mentioned by Jimbō and Miyabe in their "Ainu names of Hokkaidō plants," in Proceedings of the Geographical Society of Tōkyō.

2) D. White, The Origin of Coal, 1913, p. 91.

3) M. Caven, Text book of Inorganic Chemistry, V, 1917, p. 44.

Stein, Chemisches Zentralblatt, 1901, S. 950.

of lignite from the vegetation of past times. But, there is a wide range in the amount of carbon in several lignites from different localities.

In order to study the degree of shrinkage of the nuts in fossilization, the writer, under the same conditions, ignited the fossil nut-shells under consideration, and also large and small nuts of the recent *J. sieboldiana*, Maxim. placing all side by side in one small porcelain crucible. The whole was then put in a larger crucible, which was covered with charcoal to prevent oxydation while heating. The ignition was made in an electric furnace for six hours with a current of 5 Amp. and 100 Volts. After being cooled for twelve hours, all the nut-shells, recent as well as fossil, were found rather hardened, and made black and lustrous. The following show their lengths, widths and weights (C. G. S.) before and after ignition, besides shrinkage and decrease in weight, both in percentage.

(1) Small recent nuts.

	1	2	3	4	5	average
Length before ignition	3.00	3.10	2.95	3.10	3.05	3.04
Length after ignition	2.30	2.40	2.26	2.38	2.35	2.34
Decrease in length (%)	23.3	22.6	23.4	23.2	22.9	23.0
Width before ignition	2.45	2.40	2.45	2.40	2.40	2.42
Width after ignition	1.91	1.88	1.90	1.85	1.86	1.88
Decrease in Width (%)	22.0	21.9	22.4	22.9	22.5	22.3
Weight before ignition	6.35	6.70	6.20	7.10	6.60	6.54
Weight after ignition	1.62	1.70	1.60	1.75	1.70	1.67
Decrease in weight (%)	74.5	74.6	74.2	75.4	74.2	74.7
The mean ratio of length to width after ignition, W:L=1:1.20						

(2) Large recent nuts.

	1	2	3	4	5	average
Length before ignition	3.70	3.55	3.30	3.40	3.50	3.49
Length after ignition	2.80	2.70	2.55	2.60	2.65	2.66
Decrease in length (%)	24.3	23.9	22.9	23.5	24.3	23.7
Width before ignition	2.80	2.85	2.70	2.75	2.80	2.78
Width after ignition	2.15	2.18	2.10	2.17	2.20	2.16
Decrease in Width (%)	23.2	23.5	22.2	21.1	21.4	22.3
Weight before ignition	8.75	9.20	7.80	9.75	8.90	8.88
Weight after ignition	2.40	2.36	2.22	2.65	2.36	2.40
Decrease in weight (%)	72.6	74.3	71.5	72.8	73.5	72.9
The mean ratio of length to width after ignition, $W:L=1:1.23$						

(3) Fossil nuts.

	1	2	3	4	5	average
Length before ignition	2.50	2.58	2.80	2.40	2.60	2.58
Length after ignition	2.16	2.23	2.42	2.08	2.25	2.23
Decrease in length (%)	13.6	13.6	1.36	13.3	13.5	13.5
Width before ignition	2.32	2.10	2.25	2.43	1.82	2.18
Width after ignition	2.00	1.80	1.93	2.10	1.56	1.88
Decrease in Width (%)	13.8	14.3	14.2	13.6	14.4	14.1
Weight before ignition	3.67	4.18	3.69	3.98	2.75	3.65
Weight after ignition	1.67	1.94	1.76	1.78	1.33	1.70
Decrease in weight (%)	54.4	53.6	52.0	55.2	51.6	53.4
The mean ratio of length to width after ignition, $W:L=1:1.17$						

These ignition tables show the resulting similarity in form and size of all the nut-shells, recent and fossil. It is of a great importance in establishing the identity of recent nuts and fossil nut-shells of *J. sieboldiana*, Maxim., and speaks strongly against the separation of the fossil nut-shells of Hōsenji and Asahi-yama from the common *J. sieboldiana* Maxim., as its sub-species or variety.

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Explanation of Plate XII.

Fig. 1. Large nuts of recent *J. sieboldiana*, Maxim.

a front view. 1/1.30	b side view. 1/1.30
c top-side view. 1/1.40	d basal view. 1/1.30
e transversal section. 1/1.30	f vertical section. 1/1.30

Fig. 2. Small nuts of recent *J. sieboldiana*, Maxim.

a front view. 1/1.40	b. side view. 1.20
c top-side view. 1/1.40	d basal view. 1/1.40
e transverse section. 1/1.30	f vertical section. 1/1.30

Fig. 3. Fossil nut-shells.

a front view. 1/1.22	b side view. 1/1.30
c top-side view. 1/1.22	d basal view. 1/1.30
d transversal section. 1/1.30	
f vertical view. 1/1.22	

Fig. 4. Nuts of recent *J. sieboldiana*, Maxim. var. *cordiformis*, Makino, (*J. cordiformis*, Maxim.), side view. 1/1.30

Fig. 5. Nut-shells gnawed by some animal.

a fossil nut-shell. 1/1.30
b recent nut-shell gnawed by a mouse. 1/1.30