Correspondence.

THE SELDEN DECISION.

To the Editor of the SCIENTIFIC AMERICAN:

Your editorial in the SCIENTIFIC AMERICAN of September 25th on "The Selden Patent Case" interested me, as it seemed to me that the claim could be met without much trouble. Upon a cursory examination of my class of fire extinguishers, portable, wheeled, I find a patent to Bean, No. 75,348, March 10th, 1868, which shows every essential element of the claim in question, the single distinction in terms coming from the use of a steam engine instead of a gas engine. It would surely seem that this patent could not have been before the court as the decision would have been otherwise. A. S. DENNISON.

U. S. Patent Office, Washington, D. C.

THE NUMBER OF OUR ANCESTORS.

To the Editor of the SCIENTIFIC AMERICAN:

In the discussion of the "Number of Our Ancestors" in these columns your correspondents have been misled by the use of the word "ancestor" where kinship is defined. Under the great theory of the origin of life in a single cell or protoplasm, all living creatures are kin, and the number to which each individual is related is the total number which have been born into the world at the moment of the computation. The number for the preceding moment was something less, and if we go back the length of time embraced in a generation of mankind, the number in the kinship of the human family is many thousands less. The further back we go toward the genesis of things the smaller the human family, and the number of one's ancestors certainly could not have been in an inverse ratio, as some of your correspondents have stated.

The term "ancestor," however, cannot and does not mean the same as "kinship"; nor, in its true sense, does it apply to more than the father and mother in each family. The line of descent is a single thread running back through all ages to the very beginning of life, and in the social system of the present day the line is accorded to the male, but it could be as true of the female; it cannot be accorded to both, however, else the tangle which would ensue would strain and break the thread. These threads of anthropological progression are best conceived as the branches of a tree, living beings of the present being somewhat as the innumerable leaves, and the main trunk somewhere in the dim beginning; but in its formation each thread is like a flowing river where, tracing backward, we find branch uniting with branch, and each branch made up of uniting branch and branch, smaller and smaller, until even the rain drop is reached.

So, with the infinite insight of the Creator we might start with any human being that ever lived, in any age, in any place, of any race or color, and by that single thread trace it back, back, back to the beginning previous to the first branching. And as we so trace each life thread we may count at each branch an ancestor for the direct descent and add one, the branch of the opposite sex there uniting—two in each generation—and no more; all else are but kin. Therefore the number of our ancestors resolves itself into the simple problem of the number of branches (generations) through which the individual has come multiplied by two. CHARLES FRANCIS ADAMS.

Hampton, N. H.

Protection of Sown Crops from Crows.

Graminivorous birds exhibit, as experiments have proved, a marked aversion to foods of peculiar form and color, and also to certain aromatic and bitter substances. It has been found possible to give to seeds, without affecting their germinating qualities, flavors, odors, and colors which protect them from the attacks of crows, by the employment of cheap substances and simple methods of treatment. Suitable colors were found in Prussian blue, signal red, and anilin green. The pigments were strewn over the seed, which had been moistened with gum water. The seeds were then thoroughly mixed by shoveling and acquired a deep color. For the purpose of giving seeds a peculiar taste, pulverized alum and sodium sulphate, tobacco extrac and "fichtenin," an insecticide used for foliage, were tried, but none of these substances materially altered the flavor of the seeds. Good and lasting results were obtained only with pulverized aloes, which also changes the color of the seeds over which it is strewn. A repulsive and persistent odor was given to the seed, without affecting its ability to germinate, by a weak solution of creolin.

In one series of experiments crows were fed with equal quantities of pure seed and of seed contaminated with the pigments, etc., and the amount of seed left uneaten in each case was weighed. In another series, rows of treated and untreated seeds were sown in large cages in which the crows were confined. Experiments on the germination of the seeds were also made.

Although the results of the experiments cannot be directly applied to practice, the investigation proved that crows are influenced by color, taste and smell in their choice of food. Blue proved to be particularly repugnant, but green seeds were eaten very reluctantly, while red exerted a much slighter protective influence. The treatment with aloes was especially effective. Although it produced very little change in the appearance of the seed, the rows sown with seeds so treated were destroyed only in spots. The seeds treated with creolin were also avoided, but "fichtenin" proved wholly ineffective.

In continuing the experiments it will be especially advisable to try the effect of mordant dyeing on a large scale. Blue dyes appear the most promising, but the best results will probably be obtained with appropriate combinations of colors, flavors, and odorous substances.

Relation of Size to Speed in Ships.

BY SIDNEY G. KOON, M. M. E.

Mere size as an asset has considerable value, especially when it comes to a question of naval vessels. That this is so was strikingly illustrated a few years ago in a large shipyard, when it came to a question of the design of a fast cruiser to fulfill certain specified requirements. As a matter of fact, the cruiser was never built, but the calculations were made, based on a set of lines which gave good model results, and the comparisons herein instituted are the fruit of considerable careful thought along the lines of the conflicting elements entering into the design of the modern warship.

The original design embodies requirements that the vessel should carry a battery of two 8-inch and ten 5-inch guns, with four 3-inch automatic guns and two torpedo tubes, at a maximum speed of 23 knots. The coal carried on "normal" displacement was to be sufficient to carry the ship at 23 knots for a distance of 1,500 nautical miles. The hull was to be sufficiently strong to withstand at this speed the buffeting of a heavy sea.

The model test indicated an attainable admiralty coefficient of 240, based on shaft horse-power. The steaming radius was calculated on an assumed consumption of 1.6 pounds of coal per shaft horse-power per hour. The (turbine) machinery was designed and found to promise one shaft horse-power on 140 pounds, everything included. As worked out on this basis, the vessel was to have a length of 420 feet (waterline), a beam of 49 feet and a draft of 19 feet, the displacement, with block coefficient of 0.408, being 4,560 tons.

The horse-power required was computed by the usual admiralty formula

$$H = \frac{D^{2/3}\ V^3}{K}$$

where H is the horse-power; D is the displacement, 4,560 tons ($D^{2/3} = 275$); V is the speed, 23 knots ($V^3 = 12,167$), and K is the admiralty coefficient, 240. H thus becomes 14,000, and the weight of machinery 1,960,000 pounds, or 875 tons. The fuel required at full speed is 22,400 pounds (10 tons) per hour, or 649 tons for a run of 1,500 nautical miles at 23 knots.

Of the other weight, 40 per cent of the displacement was allotted to hull and fittings complete (1,824 tons); 10 per cent to full equipment and stores, including the officers and crew and effects (456 tons); another 10 per cent to a protective deck, the maximum thickness of which was 2¾ inches, while the remaining 300 tons took care of the battery, ammunition, and ordnance spares. The battery was practically without protection.

While this design was under completion the question of a higher speed was mooted, all other requirements as outlined above being fulfilled. A design was thus prepared, the main dimensions of which were: Length, 454 feet; beam, 53 feet; draft, 20 feet 16 inches; and displacement, 5,750 tons. The horse-power for 23 knots was found to be 16,300, which calls for 760 tons of coal to cover the stipulated radius of 1,500 miles.

The weights of hull and of equipment and stores bear, naturally, the same ratio to the displacement as with the parent ship. They are thus 2,300 tons and 575 tons, respectively. The protective deck, having the same thickness and general distribution as in the first case, weight 532 tons. The battery weights are constant at 300 tons. The sum of these five items gives a weight of 4,467 tons, which leaves 1,283 tons for machinery. On the basis of 140 pounds per horse-power, this allows for 20,500 horse-power.

Using the admiralty formula once more,

$$V^3 = \frac{HK}{D^{2/3}},$$

where H is 20,500, K is again 240, and $D^{2/3}$ is now 321. V^3 becomes 15,327, V is 24.84, or a speed of 24.84 knots may be expected to be realized. It is thus seen that an increase in displacement of some 25 per cent here permits an increase of nearly 2 knots in speed.

With the idea of determining to what extent further alterations in dimensions (while still preserving the original lines, proportions and general set of requirements) would affect the result, four other cases were briefly studied, two of vessels smaller than the first, and one much larger than the second. The general characteristics of these four (C, D, E, and F), as well as of A and B, are shown in the accompanying table, the calculations having been made in each case as outlined above. It will be seen that an increase in size to 8,900 tons (not quite double the original) brings the speed up to 27.9 knots, with 38,800 horse-power.

Weights.	A	B	C	D	E	F
Hull and fittings....	1,824	2,300	1,152	1,496	2,728	3,560
Equipment and stores	456	575	288	374	682	890
Protective deck	456	532	335	400	597	711
Battery and ammunition	300	300	300	300	300	300
Machinery and water	875	1,283	227	602	1,663	2,426
Fuel	649	760	478	568	850	1,013
Total displacement..	4,560	5,750	2,880	3,740	6,820	8,900
Total horse-power...	14,000	20,500	3,630	9,650	26,600	38,800
Horse-power for 23 knots	14,000	16,300	10,250	12,200	18,250	21,750
$D^{2/3}$	275	321	202	241	360	429
V^3	12,167	15,327	4,318	9,610	17,733	21,706
V, or speed in knots.	23.00	24.84	16.28	21.26	26.08	27.9
Length of water-line, feet	420	454	360	390	480	504
Beam, feet	49	53	42	46½	56	61¼
Draft of water, feet.	19	20½	16⅛	17⅜	21¾	23¾

It will be noted that, after satisfying all other requirements, the design marked *C* has left only 227 tons to devote to machinery, thus allowing for but 3,630 horse-power. This would make possible a speed of only 16.28 knots. Hence, the provision of covering 1,500 nautical miles at a speed of 23 knots is a manifest impossibility. To reach this speed, 10,250 horse-power is required, calling for 641 tons of machinery. If this speed is required of this ship, and all other demands be met except steaming radius, we find that we have left only 64 tons for coal, which would correspond with a radius of but 201 nautical miles. Similarly, with *D*, 23 knots calls for 12,200 horse-power and 763 tons of machinery. This reduces the coal supply to 407 tons, and the steaming radius at 23 knots to 1,075 miles.

This study of course neglects all variations in results which might accrue from variations in the conditions imposed. Thus, by reducing factors of safety, lower hull weights could be obtained, and this is frequently done, especially on the smaller ships. In the same way more power might be obtained from a given weight allotted to machinery. In this manner the smaller vessel might be made to accomplish the results here attained only by the larger. But such methods are obviously inadmissible where strictly comparative results are desired, and especially so where the effect of a mere change of size is to be determined.

The Current Supplement.

In a paper entitled "The Origin of Life," read by Prof. E. H. Starling before the British Association for the Advancement of Science, and published in the current SUPPLEMENT, No. 1766, the broad ground is taken that a living organism may be regarded as a highly unstable chemical system which tends to increase itself continuously under the average conditions to which it is subject, but undergoes disintegration as a result of any variations from this average. The practical applications of the microscope are pointed out by J. E. Barnard. Some new safety devices for steam boilers are described. Of aeronautic interest is an article on experiments with models of airships and aeroplanes in the laboratory, and a continuation of last week's discussion of the Paris aviation meeting. The Loetschberg tunnel through the Bernese Alps is described by Dr. Alfred Gradenwitz. E. E. Carey contributes an excellent article on the electro-chemical age, in which he points out that the science of metallurgy is now entering a new era. The opening of the mounds of the great capital of Egypt is the largest enterprise yet started in that country. It will probably take twenty years to complete. The preliminary work of 1907-8 at Athribis is described in an article by Prof. W. Flinders-Petrie entitled "Memphis and Its Foreigners." Recent progress in chemistry is reviewed by Prof. H. E. Armstrong.

A committee of investigation has been appointed by the American Railway Association to report upon the railways which have adopted electrification. This committee is composed of officers of roads which have electrified portions of their lines or contemplate doing so. The railways represented on the committee are the Illinois Central, Union Pacific, Southern Pacific, Erie, Delaware and Hudson, and New York, New Haven & Hartford. A proposal is now before the New York Central lines to lay out considerably over $20,000,000 during the current year, largely for the continuation of the electrification work at the New York terminal. Another section of the West Shore road between Syracuse and Utica will be electrified, and some double tracking, elimination of level crossings, and gradient revision will be carried out around Rochester and Buffalo. A considerable amount of new equipment will be purchased.