In 100 Pounds

	Timothy Hay. Pounds	Clover Hay. Pounds	Corn meal. Pounds
Composition			
Water	15.00	15.00	15.00
Ash	3.94	5.58	1.23
Proteids	4.34	9.50	8.67
Non-proteids	0.20	0.76	0.25
Crude fiber	33.08	24.46	1.86
Nitrogen-free extract	41.67	42.21	69.40
Ether extract	1.77	2.49	3.59
	100.00	100.00	100.00
Digestible nutrients			
Proteids	1.57	5.13	5.76
Carbohydrates	44.06	42.24	68.44
Fat	0.63	1.59	3.44
	46.28	48.96	77.64
Energy			
Fuel values	77.70 **T**	80.17 **T**	132.68 **T**
Maintenance values	48.89 "	58.54 "	103.30 "
Production values	25.87 "		70.72 "

The maintenance values of feeding stuffs will seldom require more than two integers for their expression in the new unit and the production values, I think, never. Expressed in this way, these values have quite the appearance and effect of percentages. It is true that if expressed per 100 kgs. instead of per 100 pounds the numbers would be somewhat unwieldy, but the actual adoption of the metric system in this country still seems distant. The reason for expressing the values per 100 pounds instead of per pound will appear if we consider the use of these figures in the computation of rations.

As a simple case let us suppose we have a ration consisting of 12 pounds of timothy hay and 18 pounds of corn meal, and that we desire to compute its production value on the basis of these tables.

The ordinary method of computing the digestible nutrients is illustrated in the first half of the subjoined table. The calculation is identical with the one with which we are already familiar, with the single exception that the number of pounds of the feeding stuff is expressed as a fraction of 100 pounds. In other words, the transposition of the decimal point is made in this number and not in the figures for the percentages.

The second portion of the table shows the computation of the ration on the basis of its energy value. But a glance is needed to show that the two are precisely similar and that the units of energy can be handled in this way in a manner precisely analogous to the manner in which protein, carbohydrates and fat are handled.

The total ration, therefore, would be as tabulated in the second table.

	Timothy Hay. Pounds	Corn meal Pounds
Digestible nutrients		
Dry matter	85.00 x 0.12 = 10.20	85.00 x 0.18 = 15.30
Digestible		
Proteids	1.57 x 0.12 = 0.19	5.76 x 0.18 = 1.04
Carbohydrates	44.08 x 0.12 = 5.29	68.44 x 0.18 = 12.32
Fat	0.63 x 0.12 = 0.08	3.44 x 0.18 = 0.62
Total	46.26 5.56	77.64 13.98
Production values		
Dry matter	85 00 x 0.12 = 10.20	85.00 x 0.18 = 15.30
Digestible		
Proteids	1.57 x 0.12 = 0.19	5.76 x 0.18 = 1.04
	Therms	Therms
Production value	25 87 x 0.12 = 3.10	70.72 x 0.18 = 12.73

Computed Ration

	Dry Matter	Digestible Proteids	Production Value
12 lbs. timothy hay	10.20 lbs.	0.19 lb.	3.10 **T**
18 " corn meal	15.30 "	1.04 lbs.	12.73 "
	25.50 "	1.23 "	15.83 "

Finally it should be noted that it is not the relative value of these two methods of expressing the content of feeding stuffs or rations which is here in question. Assuming the desirability of the use of units of energy, the purpose is to show that the manner of using them according to this scheme is quite similar to the familiar methods of computing rations, so that the transition from one system to the other should be comparatively easy, while the use of large figures is avoided. The writer would be grateful to receive the fullest criticism, both in general as regards the utility of such a unit and specifically as to the suitability of the one proposed and the propriety of the name suggested.

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THE FLYING MACHINE

THE fact that a machine of the aeroplane type built entirely of metal and canvas may be made to fly by the power of an ordinary steam engine judiciously constructed, was practically demonstrated some time ago by S. P. Langley. More would, therefore, be expected from the gas engine, if constructed with equal forethought. I have always had some misgivings, however, as to whether these experiments, into which so much devoted labor was put, actually met the real issue involved. It seemed to me that they proved that the power available in case of the ordinary engine is just about sufficient to maintain flight and no more; whereas a really practical machine should be provided with a motor whose output of work per second and per kilogram of weight, could be made enormously to exceed the demands upon it, under conditions of smooth soaring.

If one is in search of a maximum of power combined with a minimum of weight, one involuntarily looks to some form of modern explosive and in particular to those which can be worked up into wicks or ribbons. These could be adapted for use in connection with the rocket principle which has so frequently stimulated the imagination of inventors, in a way to require the least amount of subsidiary mechanism. In fact, such expansion is virtually its own propellor. The only question is, how can this quite prohibitively excessive power be controlled. In other words, how may the enormous per second expenditure of energy be reduced in any desirable amount at will, and compatibly with safety and the need of the operator?

Now it occurred to me that in case of the nitrogen explosives there may be a method of obtaining a continuity of power values within safe limits from insignificant amounts up to the highest admissible, by using some appropriate method of very cold storage. It is well known that at sufficiently low temperatures phosphorus and oxygen cease to react on each other, that fluorine is indifferent to hydrogen, etc. Is it not, therefore, probable that an explosive tendency will be toned down as temperature decreases; or that a molecular grouping which is all but unstable at ordinary temperatures will become stable at a temperature sufficiently low, and proportionately stable at intermediate temperatures. This is then the experiment which I would like to see tried, the endeavor to get a gradation of power values ending in prohibitively large maximum, by the cold storage of explosives. If it succeeds, it seems to me that a motor yielding per pound weight not only all the power needed in the flying machine under any emergency will be forthcoming, but that large amounts of the inevitably dangerous source of such power may be taken aboard for use en route. The lower temperature of the upper air would here itself be an assistance.

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ABSTRACTS FOR EVOLUTIONISTS

ANTARCTIC APTERA

PROFESSOR GEORGE H. CARPENTER has recently published[1] a report on the Collembola of the South Orkney Islands, obtained by the Scottish national Antarctic expedition. In describing *Isotoma brucei* n. sp. he remarks that it is closely related to the Arctic and subarctic *I. beselsii* Packard: "In the general build of the body and the structure of the spring—particularly the form of the mucro, with its three prominent claw-like teeth—these two species of *Isotoma* stand apart from all other members of the genus." After discussing the distribution of the Antarctic Collembola, Professor Carpenter arrives at the conclusion that the ancestor of *I. brucei* must have reached the Antarctic lands during the secondary period, and that during all the time that has since elapsed, it has undergone no more modification than is expressed by the difference between *I. brucei* of the south and *I. beselsii* of the extreme north—a difference of much less than generic value.

UNIONIDÆ OF THE LARAMIE CLAYS

IT is well known to naturalists that the eastern United States are the home of numerous remarkable groups of fresh-water mussels, which are absent from the western part of the continent, and to all appearances orig-

[1] *Proc. Roy. Soc. Edinburgh*, XXVI., Part VI. (1906).