assumes that the skater, in fact, glides about on a narrow film of water, the solid turning to water wherever the pressure is most intense, and this water, continually forming under the skate, resuming the solid form when relieved of pressure."

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Mammalian Longevity.

THE letter of Dr. Ainslie Hollis in NATURE of January 5, on "The Curve of Life," shows that the ratio existing between the periods of maturity and the periods of after-life in various mammals are capable of projection in a regular curve. This led me to inquire if the ratios might not be capable of reduction to a general formula. This seems to be the case, the statement being as follows :—

The full term of life in a mammalian species is equal to ten and a half times the period of maturity divided by the cube root of the period (of maturity), that is

$$\text{f. t. l.} = \frac{10{\cdot}5\,(\text{p. m.})}{\sqrt[3]{(\text{p. m.})}}, \text{ or } 10{\cdot}5 \times (\text{p. m.}),$$

in which f. t. l. is the full term of life, and p. m. the period of maturity.

By the full term of life is meant the period that the animal would live, supposing that its existence were not shortened by enemies, accidents, disease, starvation, overwork or nervous strain; and that it passed out of life by senile decay. This, of course, simply represents an average. It is generally accepted that the period of maturity is best measured by finding the age at which the epiphyses are united to the skeleton. It seems to be about from one and a half times to twice the period of puberty: one and two-thirds and twice seem common proportions. Man, for example, arrives at puberty at about fifteen, and is mature at twenty-five; the lion and tiger arrive at puberty at three years, and are mature at six.

A table is given below, showing the periods of maturity and the full terms of life as obtained from the observations of breeders, scientific men, &c.; and, for purposes of comparison, the full terms of life as calculated by the formula from the same periods of maturity. It will be seen that the two agree as closely as could be expected, especially when we bear in mind the difficulty of fixing with precision the normal life of a species, whose individual members will often die at widely differing ages, from different causes. Hence the different results obtained in many cases by different observers.

Animal.	Observations. Authority.	p. m.	f. t. l.	f. t. l. by formula.	Other observations. f. t. l.	Authority.
		Months. Year.	Years.	Years.		
Dormouse	Ainslie Hollis	3 ·25	4–5	4·167	—	—
Guinea-pig	Flourens	7 ·583	6–7	7·33	—	—
Lop rabbit—						
Buck	R. O. Edwards, p. m.	9 ·75	8	8·67	8	Flourens
Doe	,, ,, p. m.	8 ·667	8	8·013	8	,,
		Years.				
Cat	St. G. Mivart	1	12	10·5	—	—
Cat	J. Jennings	2	15	16·67	—	—
Goat	Pegler	1·25	12	12·18	—	—
Fox	St. G. Mivart	1·5	13–14	13·76	—	—
Cattle	Ainslie Hollis	2	18	16·67	15–20. 14	Flourens. Gresswell
Large dogs	Dalziel, p. m.	2	15–20	16·67	—	—
English thoroughbred horse	Ainslie Hollis	4·5	30	28·62	—	—
Hog	James Long	5	30	30·7	—	—
Hippopotamus	"Chambers's Encyclopædia"	5	30	30·7	—	—
Lion	St. G. Mivart	6	30–40	34·67	—	—
English horse—hunter	Blaine	6·25	35	35·63	—	—
Arab horse	Ainslie Hollis	8	40	42·00	—	—
Camel	Flourens	8	40	42·00	40–50	Grindon
Man	Buffon, f. t. l.	25	90–100	89·77	90–100	Flourens
Elephant	Darwin	30	100	101·4	—	—
Elephant	C. F. Holder and Indian hunters	35	120	112·35	120	De Blainville

The approximation of the results of observation and the formula will be noticed. Blaine on the horse, is from the "Encyclopædia of Rural Sports." He seems to have studied the subject of the horse's age very closely. He says: ". . . a horse of five years may be *comparatively* considered as old as a man of twenty; a horse of ten years, as a man of forty; . . and of thirty-five years, as a man of ninety." Up to ten years of age, then, the horse counts one year proportionately for every four of man, and as man's maturity takes place at twenty-five, this makes the horse's to occur at six and a quarter years. The full term of life given as equivalent to a man of ninety, thirty-five years is almost identical with the result of the formula. Darwin's observations on the elephant are from the "Origin of Species," where he discusses the increase of animals. The other references are from the works of various writers. It should be pointed out in connection with the dormouse, that Dr. Ainslie Hollis gave its full term of life as four years in NATURE and four and a half in the *Lancet* of January 21.

ERNEST D. BELL.

THE editor of NATURE has kindly forwarded me Mr. Ernest D. Bell's letter before publication. The formula therein stated is interesting, as it confirms the opinion, given in my previous letter on the subject, that a relationship exists between the duration of adolescence and the length of a mammal's life. Since the publication of the curve of life in NATURE, I find that the following domestic animals can be added to those already given. They conform to the requirements of the curve very closely, as may be seen :—

	Observed length of adolescence.	Length of Life. Observed by curve	Computed by form.
Guinea-pig ...	7 months	6–7 years	7 33 years
English greyhound	1 year	12 ,, 12 ,,	10·5 ,,
Cat (Mivart) ...	1 ,,	12 ,, 12 ,,	10·5 ,,
Cat (Jennings) ...	2 years	15 ,, 18 ,,	16·67 ,,
Hog	5 ,,	30 ,, 31 ,,	30·7 ,,
English hunter ...	6½ ,,	35 ,, 35 ,,	35·63 ,,

The age at which growth ceases in man differs considerably in different individuals of the same race. Otto observed all the epiphyses separate in the skeleton of a man, aged twenty-seven years (South's "Pathological Anatomy," p. 126). Such a skeleton could not have completed its growth for another ten or twelve years. The man, had he lived, might have truthfully posed as a youth when he was on the verge of forty. I have in skiagrams observed a difference of upwards of three years in the ages of different subjects, at which osseous union of the epiphyses to the finger-bones was effected. As the age of