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RATES OF GROWTH IN *KERODON RUPESTRIS* AND AN ASSESSMENT OF ITS POTENTIAL AS A DOMESTICATED FOOD SOURCE

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ABSTRACT

During a long-term study of the behavior and ecology of Kerodon rupestris *(Caviidae) in Pernambuco, numerous data were collected on growth and reproduction. Using these data, the potential domestication of* Kerodon *as a protein source was evaluated.* Kerodon *grow very rapidly, and mature at an early age. They also reproduce quite well in captivity, being fed only endemic green vegetation and supplied with water. These facts, coupled with certain aspects of the social structure of* Kerodon, *indicate that* Kerodon *may quite well be utilized as a supplemental protein source in impoverished regions of Northeast Brasil. The future status of* Kerodon *in the wild, however, is currently threatened by extensive habitat destruction.*

INTRODUCTION

Kerodon rupestris is a large (700-1000 g) rock-dwelling rodent of the family Caviidae (Figure 1) which occurs throughout the Caatinga of Northeastern Brazil (Walker, 1964). It is the only terrestrial mammal restricted in distribution to the arid Northeast, and is therefore of both ecological and biogeographical interest. Recent interest has also been expressed in the potential use of *Kerodon* as a domesticated food source. *Kerodon* is regarded as very palatable by the residents of the Northeast, and is hunted extensively. Its ability to survive the irregular droughts of the Caatinga by utilizing the endemic vegetation as a food source makes it preferable to many commonly used domestic animals, which need supplemental food and have little natural resistance to the harsh dry periods common to the Northeast.

During a recent study of the behavior and ecology of *Kerodon rupestris* in Pernambuco, I collected numerous data which reflect on the feasibility of such a program.

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Materials and methods

I maintained a colony of *Kerodon* in a large room (25 x 10 m) from February 4, 1977 to April 9, 1978. The animals were fed a diet of leaves of the local species *Ziziphus joazeiro* (Rhamnaceae), *Cassia excelsa* (Leguminosae), *Croton campestris* (Euphorbiaceae), and *Solanum paniculatum* (Solanaceae), as well as dried corn, and occasional slices of pineapple. Water was provided ad libitum. The initial colony size of 6 (4♀♀, 2♂♂) reached a maximum of 17 during the month of March, 1978, then dropped to 14 in early April.

Animals were caught in the wild by hand. *Kerodon* is extremely reluctant to enter traps, and trap success is far less than 1%. The best capture success was obtained when dogs were used to corner the animals in cracks or crevices, and the animals were removed by hand or by the use of a lasso.

The colony room contained a number of rockpiles, which were used by the animals for hiding and nesting. A number of small trees for climbing were also provided, and were heavily utilized by the animals. The rocks and trees provided a structural third dimension to the habitat which reduced the number of injuries incurred during aggressive encounters by providing escape routes for the submissive individuals. The additional habitat component also reduced reproductive pressure by males on estrous females.

Females were frequently palpated, and when they approached the end of their gestation, were palpated daily. On the day of birth, the female was weighed and checked for signs of copulation, and the juveniles sexed, measured and weighed at five day intervals until 30 days of age, and then at ten day intervals until 120 days of age. Beyond 120 days, weighings took place once a month.

Since *Kerodon* females are post-partum estrous, calculation of the gestation period began on the day of birth. Numerous copulations occurred on the days of birth, and those animals in which copulation was not observed were found to have either copulatory plugs or sperm present in the vagina.

Results

Table I presents the number of juveniles born to each female, the date of birth, gestation time and litter size. The mean gestation period is 75.0 $\pm$ 1.42 S. D. days, and the mean litter size 1.38 $\pm$ 0.5 S. D. animals.

The age in days was plotted against body weight and total length to determine if sufficient measurements had been taken to allow for the data to begin to plateau (Graphs 1 and 2). In both cases the data leveled off sufficiently to allow size predictions for all but very old animals. The natural log of age was then plotted against weight and length (Graphs 3 and 4) and Model I regression lines were calculated for the points (Sokal & Rohlf, 1969). Both weight gain ($r=.93$) and increase in length ($r=.96$) were strongly correlated with an increase in age. The correlation coefficients were then tested for significance as in Rohlf & Sokal (1969). Both lines were significant ($P<.01$). Using the equations generated, a trend line analysis was performed to predict the weights of older animals. These predictions give some indication of an optimal harvestable weight of *Kerodon* within a reasonable time period.

Discussion

As is typical of other caviids (Rood, 1970, 1972; Dubost & Genest, 1974) *Kerodon* juveniles are born precocious, and the rate of growth is very rapid. Animals three months of age sometimes weigh 500 grams, and are reproductively mature. One female conceived her first litter at 82 days of age. Trend line analysis predicts that a 200 day old *Kerodon* would, on the average, weigh 540 grams; 300 days, 589 grams; and 400 days, 624 grams. A 700 day old *Kerodon* would increase to only 693 grams. It is doubtful that even very old *Kerodon* would exceed 800 grams, since colony animals rarely reached that weight, and animals in the wild generally weighed much less. The optimal strategy for utilizing *Kerodon* as a food source would therefore be in harvesting fairly young females of approximately 120 days of age, or shortly after they have weaned their first litter. Males could be harvested sooner since it would only be necessary to maintain one or two breeder males to inseminate the female population. Male *Kerodon* were observed to maintain harems in the wild and in the laboratory. Associative breeding could possibly increase the rate of growth and sexual maturation in juveniles, but the alternate strategy of increasing maximum adult weight is probably not profitable. Since some females seem more likely to bear twins than others (Table I), it may also be possible to increase the average litter size by selective breeding of twin bearing females. It also may be that twin bearing occurs only after a number of individual births in a given female. Using more mature females as breeders and harvesting younger females may therefore be an efficient strategy for increasing fecundity of the colony.

The excellent breeding success obtained in the colony was probably due in part to the size of the room. The *Kerodon* were provided with sufficient space to minimize injuries through aggressive contacts and the normal behavioral sequences involved in reproduction were not inhibited. Some animals were also maintained in cages approximately 1m x .7m x .5m. Reproduction was not obtained in these cages. I would estimate 1 cubic meter as a minimum area per pair that would be sufficient for reproduction. An ideal situation would be the construction of large outdoor pens designed to prevent escape by climbing. The pens could be constructed to include vegetation such as *Solanum* or *Cassia* which is of no economic importance. Sugarcane and corn stems and leaves could also be provided as an additional food source. Empty wooden boxes could be provided for nesting and shelter, and would facilitate capture. This design would exploit *Kerodon's* ability to thrive on endemic vegetation of little economic value. A supplemental protein source could, in this manner, be provided in impoverished areas with little additional expense on the part of the farmer. Financial assistance for pen construction would alleviate expenses and provide an incentive for implementation of the program. It must be noted that these observations have been made on relatively few litters (17) and a much more intensive study of reproduction in *Kerodon* should be undertaken to assess the actual feasibility of such a domestication program.

Although *Kerodon* is still relatively abundant in many parts of Northeastern Brazil, its future is probably being threatened by extensive habitat destruction, via cutting and cultivation of available habitat. *Kerodon* is restricted in occurrence to large rockpiles and *serrotes*, and interconnecting forest, where the forest is mature, and the trees are large enough to offer shelter in the form of knotholes or cavities (Figure 2). Near Parnamirim, Pernambuco, for example, there is a large population of *Kerodon* utilizing a relatively undisturbed stand of *Bumelia sartorum* (Sapotaceae). In many areas, this interconnecting forest has been cut, leaving small populations of *Kerodon* reproductively isolated from other populations. This isolation may have grave effects in terms of increased hunting pressure and intensive inbreeding on the future status of *Kerodon* in the Northeast. I strongly recommend the consideration of the establishment of natural reserves of Caatinga habitat, to protect not only *Kerodon*, but also one of the unique ecosystems in tropical America.

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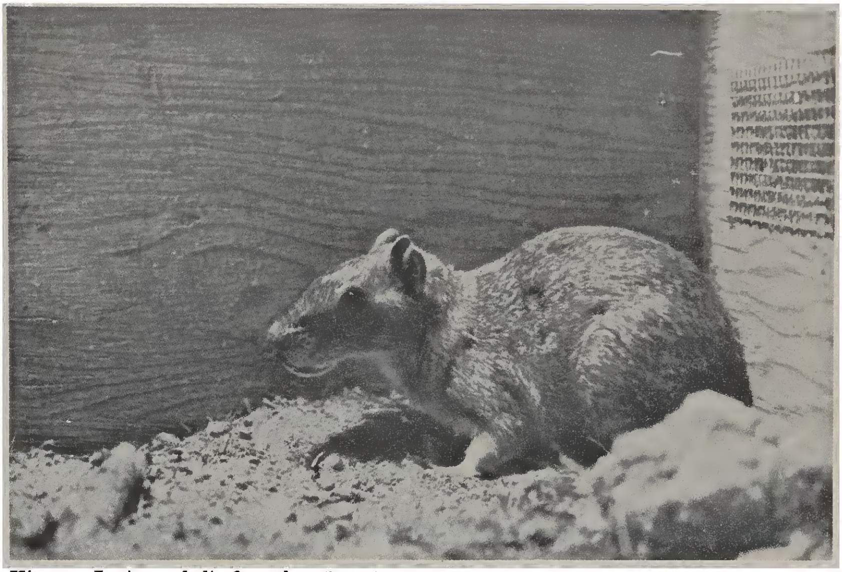


Figure I. An adult female *Kerodon rupestris* weighing about 750 grams.

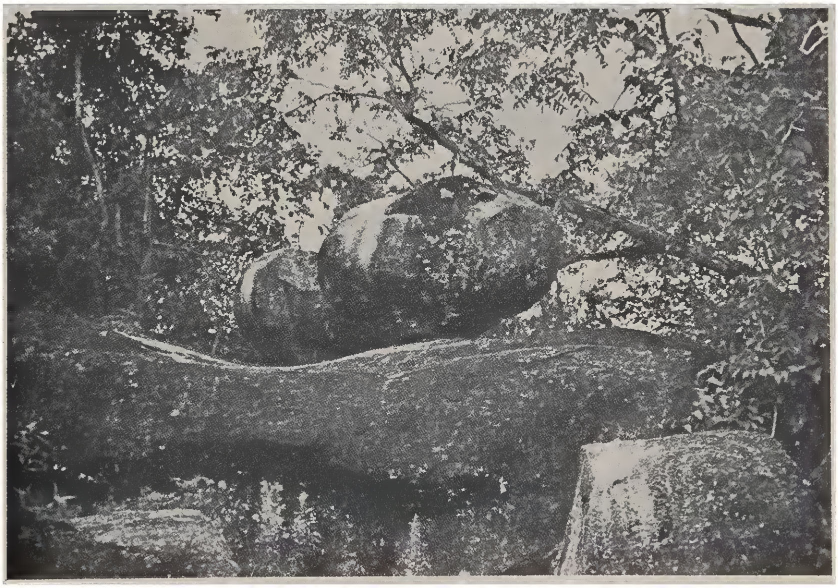
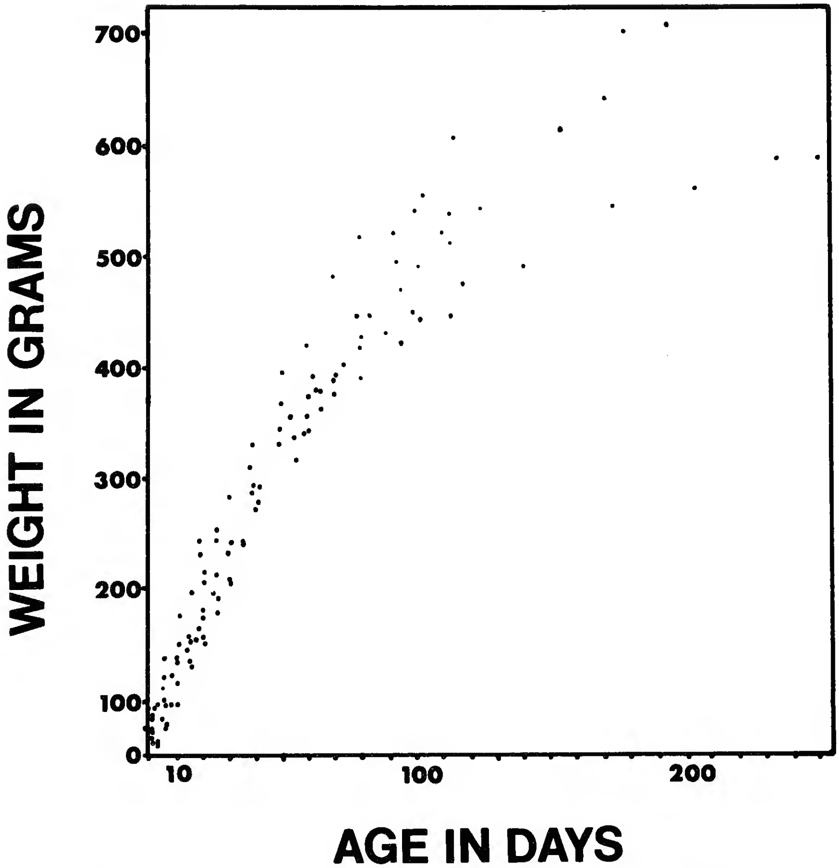


Figure II. A view of *Kerodon* habitat near Exu, Pernambuco. The animals dwell in the crevices in the rocks and forage on leaves in the canopy.

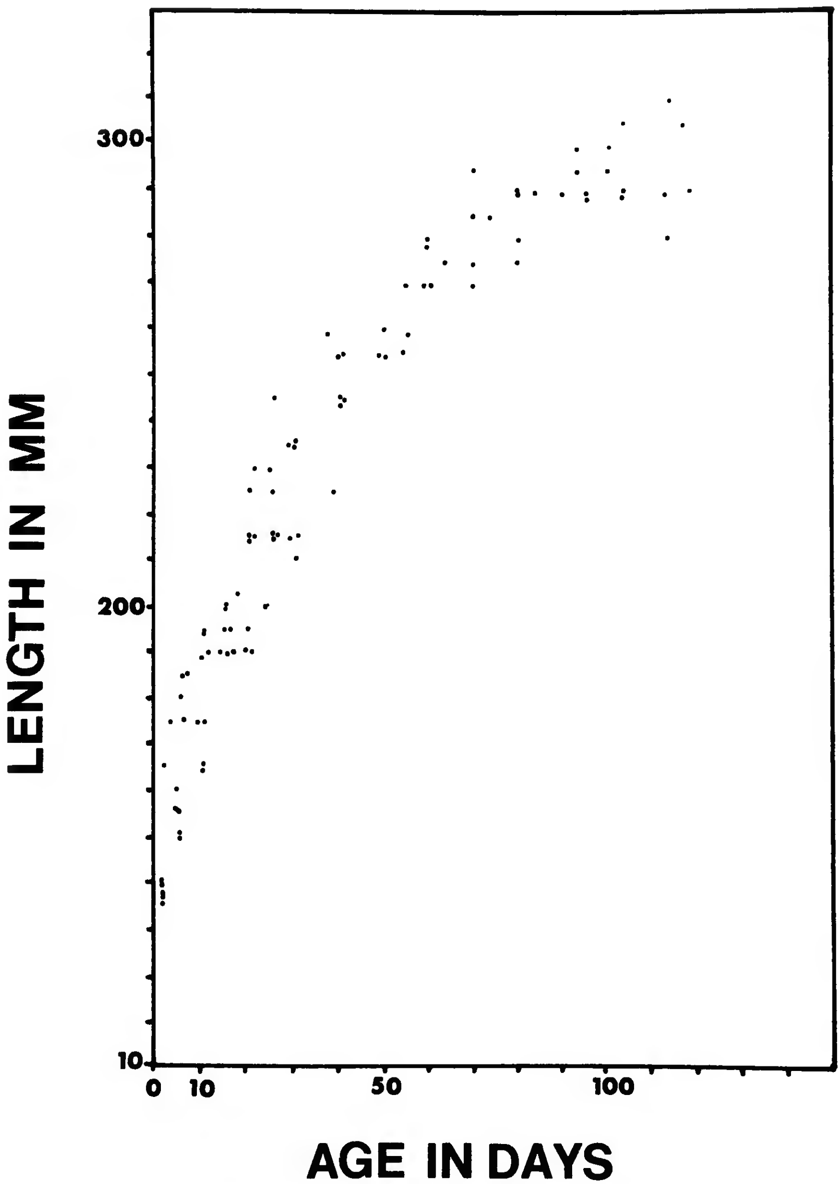
TABLE I

Females and juveniles, with date of birth, gestation and litter size. The births indicated with an asterisk occurred after a temporary separation of the animals. An accurate gestation cannot therefore be calculated.

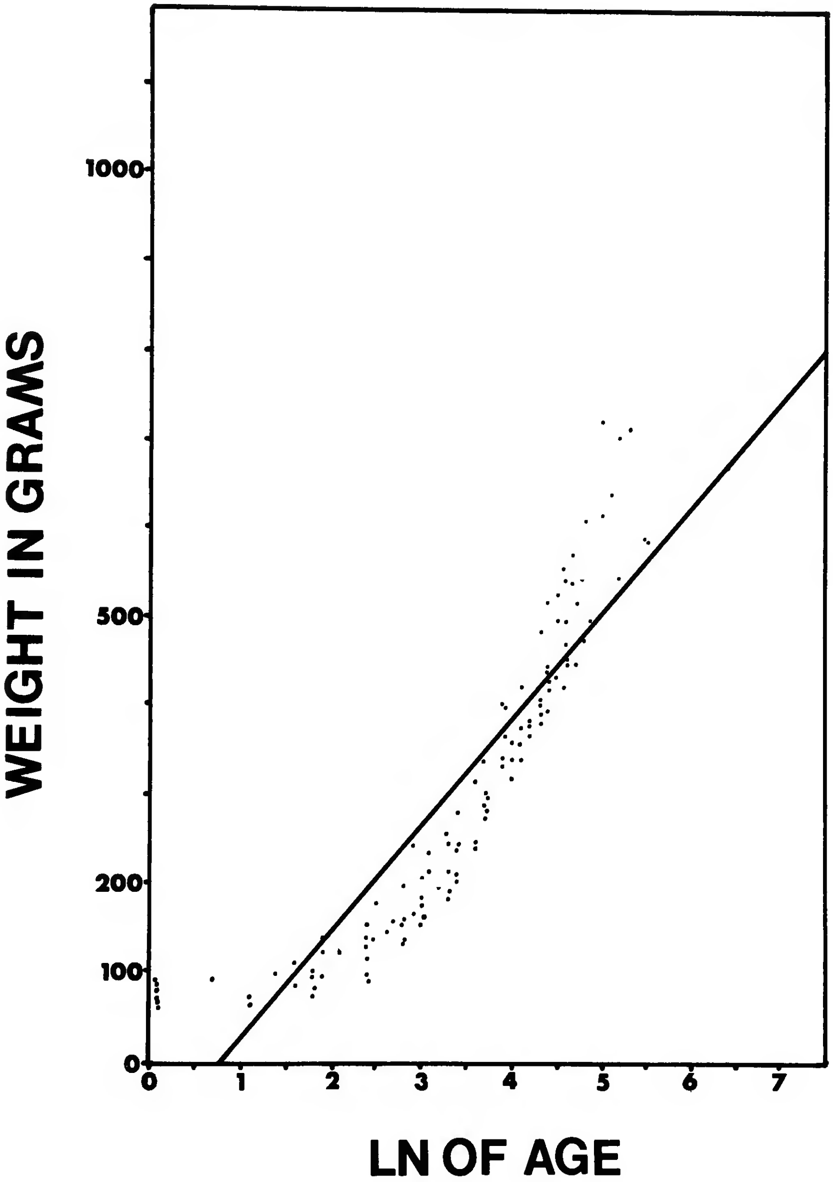
Adult	*Juvenile*	*Date of Birth*	*Gestation*	*Litter Size*
B	♂ J2	Late July, 1977	—	1
	♀ JF	October 3	—	1
	♂ B2	December 17	76	2
	♂ B3	"	"	
	♂ J10	February 27, 1978	72	2
	♀ J11	"	"	
	♂	May 13	75	2
	Sex unknown	"	"	
	"	August 24 *	—	2
		"	—	
F	♀ JR	September 27, 1977	—	1
	♀ B1	December 13	77	1
	♂ J12	February 27, 1978	76	1
	Sex unknown	August 30 *	—	2
	"	"	—	
J	♂ J5	October 20, 1977	—	1
	♂ J9	January 4, 1978	76	1
	♀ J14	March 20	75	1
	aborted	May 14	—	2
	"	"	—	
JR	♂ J13	March 3, 1978	—	1
	♀	May 15	73	1
	♂	August 20 *	—	2
	♀		—	
Average			75.0±1.42	1.41±.51



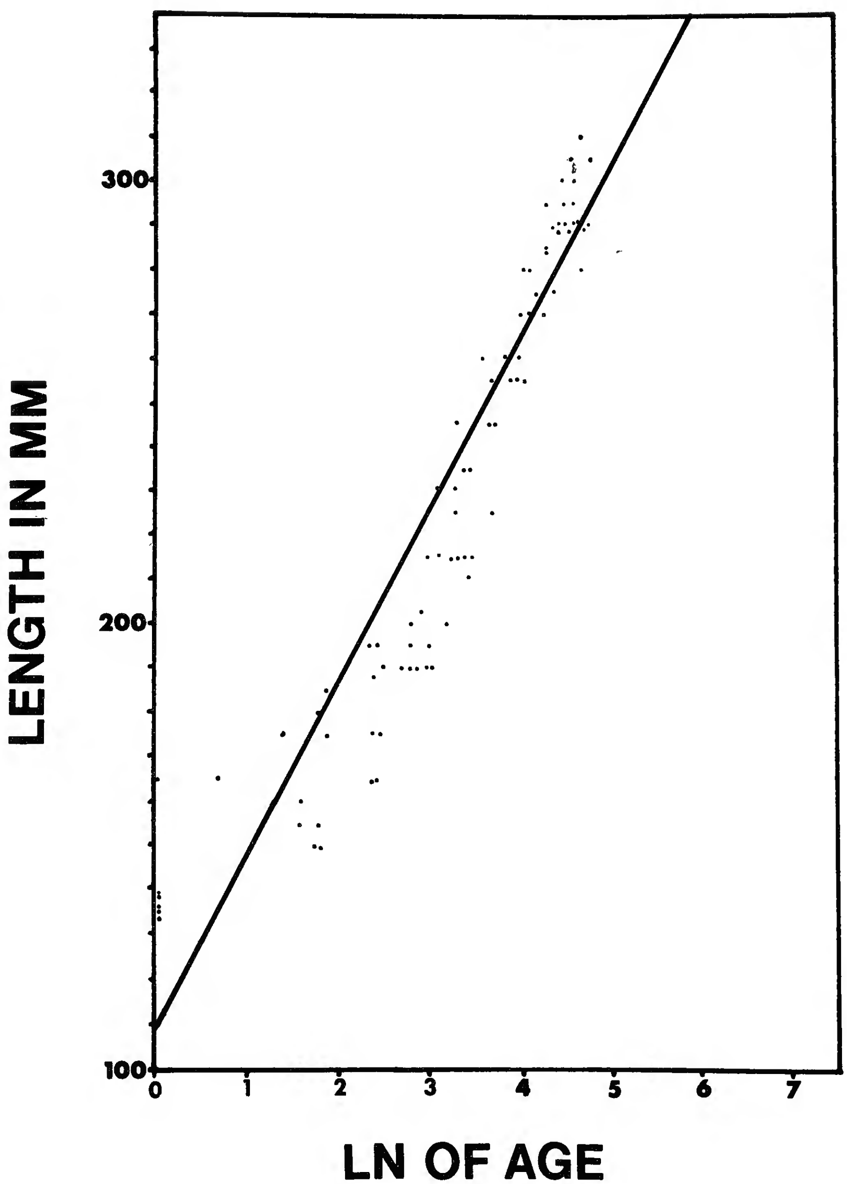
Graph I. The animals exhibit a relatively constant rate of growth until approximately 120 days of age, when the rate begins to decrease, and weight begins to level off.



Graph II. The rate of increase in length is relatively constant until approximately 70 days of age. Beyond this age, *Kerodon* increase in bulk, but not in length.



Graph III. Plotting the natural log of weight vs. age generates a straight line relationship. The equation for the above line is $Y = 122 \ln X - 160.2$.



Graph IV. The natural log of length vs. age also gives a straight line relationship. The equation for this line is $Y = 38.6 \ln X + 106.6$.