**Ideas from film and book** [**The Future is Wild**](http://www.thefutureiswild.com) **are put in basis of present works. The author admits the priority of English scientist Dougal Dixon in researches in the present field of knowledge. The creating of the present works did not pursue the purpose of assignment of any ideas of Dougal Dixon. The author simply tells his own ideas about this theme. Let the reader judges itself as far as his opinion is true.**

***(Reflections above book and film)***

At the end of the 2002 at the “Animal planet” channel the animated educational serial “The future is wild” had been demonstrated.   
In brief opening address to this film numerous professors and doctors of Philosophy from various inspiring respect institutions assured that the contents of film and logic of thinking of its authors fully comply with natural principles and laws of evolution. In comments due to course of film scientists tried to confirm ideas with real facts taking place in wildlife of our time.  
Some months after watching this film completely, at the XVI Moscow International book fair I had bought the book “The Future is Wild” (two variants of this book had been printed: "facilitated" and full. I had bought full one, including 160 pages, therefore at references I always shall mean it). The book, certainly, is very beautiful: an excellent paper and the magnificent color illustrations created with the help of computer 3-D graphics. By the contents this book not absolutely coincides with film, sometimes supplementing, and anytime contradicting it. Authors of this book are Dougal Dixon and John Adams. In credits to film “The Future is Wild” Dougal Dixon is mentioned as the creator of strange and sometimes times horrible heroes of film.  
However both film, and the book have caused at me a lot of bewildered questions, because heroes of this project, as it seemed to me, not so correspond to laws of evolution, to which specially invited scientists appeal. The book has partly removed some questions caused by film. To tell the truth, thus it has brought a lot of new questions, to answer which adequate is also difficult, if to make a start from laws of evolution.  
“Having armed” with the literature, I had decided to dispel these doubts. For this purpose the book of N. F. Reymers “Ecology. Theories, laws, rules, principles and hypotheses” (Moscow, Magazine “Russia Molodaya” publishing, 1994) has perfectly approached. In it principles of development of live systems are full enough collected and perfectly stated. In this book there is a set of laws concerning principles of evolution of the organic world of the Earth. They were formulated in different time and by different scientists, therefore it is possible to assert safely, that they are not “widely known in narrow sections”, and all supporters of the theory of evolution know them.  
Because the film in my consciousness was initial, and the book was secondary, I have arranged the comments to the project (we shall conditionally name so the symbiosis of film and book) “The Future is Wild” according to the order and names of film series. I think, it is simple to correlate them with the appropriate chapters of the book.  
For now we shall go deep into abysses of time, and we shall try to understand, as far as the future on a small blue planet, the third from the Sun, can be wild...

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| **Ice age warriors** |

***The dog jaw of the sabertooth glutton.***

One of animals of the future, shown in this series is the furious snow predator, snow stalker, preying large animals. The fact, that the predator preying chase larger than itself, can have long saber-like canines, is quite explain and real. This is the fine adaptation to kill very big animals with thick skin and fur.  
However all sabertooth animals, except for one shown in film, have some features of similarity. In particular, at them there are rather short and extended vertically face bones. It is enough to look at skulls of sabertooth cats and marsupial Thylacosmilus to be convinced in it. At fossil mammal-like reptiles (Theromorpha, Gorgonopsia), certainly, there were long jaws with saber-like canines. But their skulls were high, extended vertically, and the basis of the canine was made more solid with thick jaw bones.  
At the snow stalker from the future the skull has absolutely other form: long canines are in the forward part of a muzzle, and jaws are more similar on dog’s ones - they are extended and low.  
The form of jaws directly depends on character of drawing of the bite to the prey by the predator. The dog with long jaws catches prey, not trying to stick teeth deeply, and puts extensive superficial wounds (it “tears” catch). Thus the effort of jerk is allocated along the jaw. The sabertooth cat sticks canines deeply into the prey body (it pins up catch), and the pressure is allocated across the jaw. Jaw bones of sabertooth predator are arranged so, that pressure of force of counteraction to the bite passes along short bones and is allocated regularly by the front part of the skull. The skull of marsupial sabertooth Thylacosmilus and sabertooth cats has in connection with it very specific form: the form of face bones as if continues the bend of the canine. At the snow predator between lines of canine and the top jaw there is the appreciable corner - almost 90°. If the snow predator (existing in such shape as it is shown in film) will strike a bite by its saber-like canines, big troubles wait for it. Its muzzle (jaw bones) is thinner and weaker, than at sabertooth cats or marsupials. From strong cross loading the top jaw can simple crackle and break somewhere in area of the first molars.  
Therefore I can not admire with the fine adaptation of this animal to the predating.

***The gannet with goose paws – the “artiodactyl horse” of the evolution.***

Certainly, it is possible to consider as a trifle this remark, but nevertheless I shall allow myself to say spiteful things once again. Not having noticed anything especially impossible from the point of view of biology in the image of the huge bird gannetwhale similar to the seal, I had paid attention to the next miss of artists of 3D-animation of the film. The matter is that the prototype (and the ancestor!) of this sea bird, the gannet (Sula bassana), concerns to order of birds Pelecaniformes. At them the palama connects all four toes, the back toe (I) is connected by palama with the internal finger (II). And the gannetwhale should belong to the same order or to be the representative of undoubtedly related (descendant) order! And at ducks and geese (order Anseriformes) the palama connects only toes II, III, IV. Back (I) toe is free. According the shape of the floating gannetwhale, shown in film on the scheme, it nevertheless has goose paws. Certainly, it is not comparable with monkeys babookari running back to front (I’ll write about it later), but nevertheless it slightly cuts to the quick.

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| **Survivors in salt** |

***The black-masked robber.***

These series of film and the chapter of the book have caused at me least questions and bewilderment. The only thing about what it would be desirable to tell few words, is the family tree of the graiken – the predator of karst caves of the Mediterranean desert. The forest marten is attributed to ancestors to this animal. I completely can not exclude such course of events – you can see the ground squirrel in Northern America. But the origin of graiken not from the marten, and from much more ground predators - ferret or hermin, can be more probable. They would need to pass much shorter evolutional way, turning to the ground predator similar to the bullterrier-sized dachshund. The marten is more specialized for life on trees, therefore it should strongly change not only anatomy, but also behavior, turning from the predator of the three-dimensional world of wood crones to the predator of the two-dimensional world of ground surface.

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| **Raiders of grassland** |

***Is the babookari the end of history of primates or the new page of it?***

Having the strange wish to exterminate as much modern animals, as possible, founders of film and the book “The Future is Wild” had considerably “thin out” practically all order of primates. I do not think that it is correct. The matter is that primates have successfully passed the durability test. So, the primitivest representative of primates, Purgatorius, had gone through mass extinction of fauna at the end of the Cretaceous period, when all dinosaurs (two orders of reptiles!) and set of other animals including mammals, have died out practically without leaving a trace. During the Cenozoic era primates have gone through changes of the climate at the end of Eocene, ruined set of archaic orders of mammals, and also ice ages of Pleistocene and Holocene, pushed aside heat-loving fauna and flora to equatorial areas of the Earth. Now on the Earth there is a set of species of primates, both the high, and the primitive ones. And their fauna and areas have developed under influence of last congelations! Therefore the full extinction of primates even in the most terrible (within the limits of allowable) an ice age is rather incredible. Some primates well enough adapt for changes of the natural environment. It is mistakenly to suppose, that all primates are by all means connected in their life with tropical forests. So, Japanese snow macaques Macaca fuscata tolerate snow winters of the north of Japan, and in zoos and in partially free conditions they had normally existed without warm shelters in conditions of the Central Europe (Germany) and Northwest of Russia (the Leningrad zoo). Besides, the Japanese macaques can live in coastal zone of the sea, eating sea animals equally with usual food. Other macaques (M. mulatta and M. sylvanus) live not only in forests, but also in woodless district. Some baboons (Papio) in wild nature live in open district (savannas, mountains). Indian leaf monkey (Presbytis entellus) lives in India from tropical woods up to mountain meadows (4000 m above sea level). The gelada (Theropithecus gelada) lives in mountains of Ethiopia on stony areas and in thickets of bushes at height more than 1800 m above sea level. Among guenons in savanna the hussar monkey (Erythrocebus patas), and green guenons (Cercopithecus aethiops and C. pygerythrus) live. The monkeys have not connected with forest habitats, apparently, are rather numerous. In case of reduction of the forest areas they will have chance not only for survival, but also for expansion of areas. Monkeys of New World and apes, most likely, will be not so lucky in the case of ice age; but though it is necessary to remember, that largest of known primates, Giganthopithecus, lived on the Earth in the time of Pleistocene congelation. Besides it was an ape! Among lemurs the semi-ground ring-tailed lemur (Lemur catta) has chances for survival. Sifaka (Propithecus verreauxi) also spends a lot of time on the ground. It is necessary to remember, that in precipitations of Pleistocene at the Madagascar lemurs, convergent similar to baboons are found. African bush baby (Galago) also lives not only in forests, but also in woodlands, and in bush. So, primates have huge chances of survival, but not all.

***Rattling... back.***

The strange rodent rattleback, the inhabitant of Amason region savanna, practically in anything has not caused at me doubts in an opportunity of the existence in the future, except for some features. So, the head of rattleback from Amazon savanna is very much similar to snake’s one by huge mouth cut. It is practically deprived such characteristic feature of mammals, as soft lips. And it is strange - how rattleback cubs will suck milk? Fire resistance of the rattleback’s armour causes some doubts too. Keratin, of which the armour consists, is nevertheless the protein. And protein as well as any organic substance does not differ in special fire resistance. So rattleback nevertheless should suffer rather strongly in savanna fire - tortoises protected not only with horn, but also with the osseous armour, much more mineralized and less combustible, burn down in fire.  
Surprise is caused with relations of rattleback species from meadows of Amazon region and from desert of Northern America. The matter is that the North-American species is more primitive than Amazonian one, therefore it can not be the descendant of South-American species! Primitive features of the northerner are: muzzle covered with fur (at southern species it is covered with shell plates) and presence of tail (the southerner is ecaudate (tailless)). As we see, according the constitution the southerner is more specialized species. Therefore their relations stated in film “The mystery of spinks”, do not correspond to the law of irreversibility of the evolution, formulated by L. Dollo:

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| “The Organism (population, species) can not return to the former condition, which has been already realized in the number of its ancestors”. |

Undoubtedly, ancestors of southern rattleback were caudate and had hairy heads. But southern rattleback had lost them, so, this features can not appear again at its northern "descendant". But they are at this species, hence, it can not to be the descendant of southern species!  
One more strange feature of southern rattleback is its diet. Specialization to feeding by eggs of large (and very dangerous!) species of flightless birds is more than strange feature of initially very timid rodent. Both possible (according the film) ancestors of the rattleback, agouti (Dasyprocta agouti) and paca (Cuninculus paca) are very timid animals; it happens, that the agouti die because of strong fright. How could they follow the road of such specialization? Most likely, these species in the beginning "had armed", not changing the traditional vegetative diet, and only having armours, they included to the diet eggs of predatory huge birds carakillers. Rattleback can not eat only eggs: it is very seasonal kind of forage, accessible during some months per year. All rest of the time they should live half-starving. Most likely, eggs of large birds are only pleasant dessert, which owners, to tell the truth, can kill, and will not ask the name.  
In the book The Future is Wild” it is told about the same animal, that its diet is various and includes different plants and animals.

***Lapse of movie-makers – the hunting Carakiller***

There is in film “Raiders of the grassland” one episode, which has caused a smile at me. I advise to watch very attentively an episode of film in which at the circuit huge predatory bird carakillers hunting monkeys babookari are shown. Especially I advise to pay attention to position of models of monkeys. They stand a half ring, heads outside. The TV-camera moves and shows this stage from above. It is visible, as one model of predatory bird bypasses herd of monkeys, and hunting begins. The circuit of birds starts to chase monkeys, and at this time... monkeys turn by heads to chasers, and run back to front! There are no doubts - the mane on heads of monkeys models is well visible, and at the moment of chasing of primates it is inverted back!

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| **The mystery of spinks** |

***The true mystery of spinks.***

Spink is the flightless bird similar to mole. Colonies of these creatures live under the ground and dig long burrows, reaching up to food. If in film their life does not cause the special questions, in the book there is a fact, forcing to scratch a nape:  
“Only one female in the colony – the queen - is capable to pair and to lay eggs. She can adjust sex of the future nestlings and their ability to pairing, adding in eggs certain hormones” (“The Future is Wild”, page 56).  
This fact also has puzzled me. There is, certainly, in modern Africa the species of mammals, which habit of life has inspired authors of the book and film to the invention of burrowing bird spink. It is the rodent Heterocephalus glaber, living in Ethiopia, Kenya and Somalia. In its colony there is only one female capable to breeding, and all other individuals care of her and her posterity. At spink as it is seen, the same feature occurs(will it occur?). Similar examples can be found at fishes. So, it is the sea fish known as clown fish (but at this fish the main pair looks at the posterity). The reason of sterility of individuals from number from the nr. three up to nr. last is elementary stress, that is in the colony; it is enough the simple presence of main pair to “castrate” subdominant individuals **by themselves** by emitting of hormones (for example, the simple adrenaline) in the blood. And it is simple to control them from outside – to main pair it is enough to show the superiority more often. Thus, hormonal "castration" by queen of other individuals for all their life becomes simply excessive, and even harmful: the situation can change so, that the colony will lose the fertile queen. Then the colony will die - there will be no female, capable to replace the queen. Also at the increased mortality of colony members queen’s efforts in laying eggs will not suffice for reproduction. Then the colony can be lost, or the second queen had to appear. Thus, not the queen, but conditions of environment should adjust relations of queen and working individuals of the colony. Then the colony will be capable to answer any change of environment adequately. At Amphiprion fishes it occurs: if one fish from main pair perishes, “number three” becomes capable to breeding.  
The question of sex determination at colonial animals with natural "absolute monarchy" is solved differently: at bees from fertilized oosperms females, and from not fertilized - males (drones) excluse. At vertebrates features are more artful. At clown fishes “number one” in a colony is always the female, and second one is the male, other fishes have no sex. When the female perishes, “number three” becomes the male, and the male for some days changes sex and turns to female though it could be the first-rate male earlier and had regularly fertilized eggs. At fishes sea angels (Pomacanthus) “number one” in school is always the male, and other ones are females. If the male will be lost, the main female should accept the domination and the male sex. It becomes possible because the sex at fishes can be determined not only genetically, but also by conditions of environment. So, at the Amazon fish butterfly perch (Apistogramma) in acidic water more females, and in alkaline one - males hatch. At clown fishes and sea angels the sex is determined by hierarchy. At more progressive animal - reptiles - the sex can be determined by temperature of egg incubating. It is known, that at turtles and crocodiles at higher temperature of incubating more females hatch, and at lowered one - males. But mammals and birds are creatures of other order. Their organism is more closed and rather more independent system, than the organism of fish and reptile (You see, the house-keeping of mammals or birds is easier, than reptiles, and there the parameter of autonomy of organisms of first ones and openness of organisms of last ones is seen). At them the sex is determined only at the chromosomal level. Already at fertilization it is clear, who will be born: the cock or the hen. To tell the truth, at animals and birds the sex of posterity is differently determined: at mammals males, and at birds - females have different sexual chromosomes (XY). It shows well the independent formation at them of this attribute. Hormonal influence to sex at vertebrates is probable only partially: at surplus of female sexual hormones at the female the male embryo can become similar to the female. But genetically it nevertheless will be male. Such way of sex regulation is possible principally, but it works only when the embryo is in close contact to the parent organism for a long time (at mammals).  
At spinks such trick is unsuccessful: the egg stays in mother’s organism short time (about day as at the most part of birds), and the oosperm loses contact to the mother’s organism even earlier: after fertilization the bird’s oosperm does not attach to the wall of an oviduct (as at mammals), but is covering by egg envelopes and egg shell. Further the egg is laid by the female and hormones can be entered into it only by syringe. And spinks precisely have not invented syringe. Therefore the female, hatching already laid eggs, can not affect to sex of future chicks.  
Assuming at spinks hormonal sex regulation of nestlings, authors of this “species of the future” conflict to the L. Dollo’s law of irreversibility of evolution. The primitive form in this case is the sex determination of posterity by external factors, and progressive one is genetic sex determination. Therefore this burrowing mole-bird will not be so artful arranged as “scientific fathers” suppose it in the book.  
The blindness attributed to the bird spink looks strange thing:  
“... spinks are practically blind!” (Page 57)  
I can not agree with it for the several reasons absolutely:  
**First,** both in film, and in the book at these birds large eyes protected from sand by rich hair-looking feathers, carrying out a role of eyelashes are appreciable. And if eyes are protected, it means, that they normally work and there is a sense to protect them. Life in darkness is not necessarily accompanied by disappearance of eyes - other variant is also possible. Among deep-water and cave animals equally with blind very “big-eyed” forms are known also.  
**Second,** in film (not in the book!) it is well visible, that males differ from females with more contrast colouring and bright colouring of back and tail. As any attribute has biological sense, it is possible to assume, that colouring plays a part in sexing at animals of the present species. Hence, spink is not blind creature; for a blind animal dimorphism in colouring is not necessary. Besides in courtship ritual of spink, shown in film, males attract females by the special "drum-type" movements of paw-looking wings. For quite clear reason I can not tell, what plays the basic role in attraction of the female - movements of wings or “drumming” by the ground which they make. Therefore I can assume that if for females it is more important than movement, rather than sounds, sight at them must be advanced. Otherwise such feature of behavior simply would not be developed, as it would not have biological sense.  
**Thirdly,** if to assume, that spink is blind, it is necessary to think of what feeling will replace sight to it. At blind mammals this is the sense of smell, and at snakes (whose sight is substantially lost) - the chemical feeling close by the nature to sense of smell. This feeling should give a creature the objective and full information about environmental objects, including such ones with which the animal does not cooperate directly. At spink the sense of smell can not be advanced: spink had evolved from gallinaceous birds never spending for food search a lot of time and do not involving thus any special skills. In the nature there are, certainly, birds with the advanced sense of smell - the American vultures (Cathartidae). But they concern to rather primitive birds, and their habit of life assumes search of invisible, but strong smelling carrion. And the food of gallinaceous birds is very accessible and is not hidden – it consists of plants. For their search sense of smell is absolutely not necessary. Therefore sense of smell at spinks will not begin to develop, because olfactory lobes of brain are strongly reduced as at their ancestors. And the return from the specialized condition in primitive is impossible - evolution is irreversible.   
Touch and taste senses work only at direct contact to objects, the hearing is practically useless at research of lifeless objects, sense of smell at the majority of birds is advanced very poorly. Therefore from five feelings in interaction with world around at spinks the sight will play nevertheless the main role.  
As far as the probability of occurrence of such species, as spink is, is great? It is very small. And there are two reasons for this. **First,** birds in comparison with other classes of tetrapods are very conservative. If to compare the body shape of different reptiles (lizard, snake, sea turtle, plesiosaurus, Brachiosaurus, Iguanodon, Tyrannosaurus, crocodile, pterodactylus, Cynognathus) and mammal (rat, bat, flying lemur, mole, whale, kangaroo, gorilla, giraffe, hippopotamus, elephant, antelope, sloth, seal), it is possible to see, how various externally they are and how many vital forms they had formed in the past or have in the present. In comparison with them birds are extremely conservative. At the best case at them three variants of a structure are present: flying (the majority of birds), ground (“ostrich-like”) and swimming (“penguin-like”) with some transitions between them. Birds are specialized to flight and life in open habitats, therefore occurrence completely burrowing form among them is absolutely incredible. The puffin submitted as a sample of modern burrowing bird, however is able to fly and to swim. It is far by the habit of life from burrowing mole-like spink. And **second reason is:** so sharp change of habit of life by flying bird can take place only in the case when advantages of new habit of life will favor to survival. For example, it will be possible, if underground life will be more favorable from the point of view of food abundance or absence of competitors and enemies. Under the ground there is some food, but it is more difficult for getting - the thickness of the ground which should be dug prevents it. There is less number of predators under the ground, than on the surface, but there is plenty of competitors: they will be mammals, rodents already presently having underground habit of life. Rodents easily had endured ice ages of Pleistocene and Holocene, therefore it is possible to assert safely, that they will survive in the future. And at presence of underground species of rodents the bird hardly can pass to underground habit of life: the competition will be too great, and benefits - too insignificant.  
And roots of desert turnip are easy for digging out from the surface: gallinaceous birds are big masters to dig ground by legs and by beak.

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| **Giants of the swamp** |

***Can toraton be careful mum?***

In film and book authors result as the possible inhabitant of the Earth the future toraton - the huge reptile, the descendant of the tortoise. So, about it they tell that this animal weighs about 120 tons, lives in herds and cares of the posterity. I also want to discuss these hypotheses.  
How will the huge tortoise - toraton lay eggs? The maximal size of the egg at terrestrial animal presently is 9 litres (the egg of recently dyed out, almost modern bird Aepyornis, whose weight is supposing approximately in 500 kg). Eggs of dinosaurs (even the largest, 100 - 110-ton species) were not larger, and even smaller than these ones (and the animal laid them was many times more massive than the most fattened Aepyornis). Hence, the expecting of the laying of so huge eggs (possible, 100-liter ones) from 120-ton animal is completely incredible. At such eggs the ratio between the shell area and volume (and also the embryo’s need for oxygen) is the extremely adverse. Certainly, the quantity of oxygen in atmosphere of the Earth in the future can increase. But as far as it be? In Carboniferous and Permian periods (time of huge insects existing) the contents of О2 in an atmosphere was about 30 %, that only ~1.5 time more than modern one. But, if the egg of toraton even will be twice larger than the greatest possible size for our time (at 21 % of О2 in an atmosphere), its volume will increase at 8 times, and the surface - only at 4, the relative surface appears 2 times less, that means it will “be backward” the rise of contents of О2 in air even 1.5 time. Hence, enrichment of the atmosphere with oxygen will have only insignificant effect to the increase of the egg size of terrestrial vertebrates.  
The care of posterity at toraton also departs in area of science fiction. If to take into account the fact, that eggs of toraton can not be large (concerning the size of the animal), it is possible to predict that just hatched from eggs cubs of toraton will be very small (possible, 10 - 12 kg, proceeding from approximate parameters of egg of Aepyornis adjusted for contents of О2 in atmosphere). It makes less than 0,01 % from weight of the adult animal. Is it possible to imagine realization of parental instincts of the 120-ton female of toraton? Taking into account, that the incubating of eggs of modern tortoises lasts from 40 up to 140 days (and it takes place not at largest species, for gigantic tortoise Aldabrochelys gigantea term about 162 day at +28°С is mentioned), it is logical to assume, that eggs of toraton will “ripe” even more long time - possible, up to 7 - 8 months. Imagine what the female of toraton, protecting the nesting place, would make with environmental vegetation during 7 - 8 months! I think, she would have eaten up to roots the forest kilometer far around of the nest! If to sum here her numerous “relatives” trampling near, the situation would be just like in modern African reserves: elephants eat all vegetation at protected territories. To avoid the ecological accident, toratons should live constantly moving, continuously migrating across huge territory. Hence, the female most likely would leave the nest after laying of eggs: all species of modern turtles act so. Hence, there can not be any relations of consanguinty between toratons in herd; herds of these animals most likely would be formed by animals of close age from different hatches or the young growth would bunch to the generated herds. Besides if cubs of toraton are very small in comparison with adults, adult individuals simply could trample own young growth at movement of herd.  
In view of this fact the statement from the book that the female helps cubs to hatch (page 86), also is the purest invention. Even at philoprogenitive crocodiles the cub should leave the egg shell itself. And the difference in size of egg and mums can result to that the toraton female simply will crush cubs by the beak instead of helping them to hatch.   
The hero of N. V. Gogol’s “Dead souls” Kifa Mockievich was asked somehow a certain question: “Well, and if the elephant was born in the egg, you see, methinks the shell would be strongly thick – it can not be shot through by the cannon; it is necessary to invent any new fire instrument”. Toraton is practically that elephant, even it is few times larger. And nevertheless its egg should not be a certain supernatural object. If the shell of toraton egg will be so thick, that the cub can not punch it from within, it is necessary to assume, that the egg shell will be dense. But everyone who considered egg shells under the magnifier, knows, that it is not integral, as the piece of ceramic pot, but porous. Pores are necessary for breath of the embryo. And if the shell will be very thick, beforehand it is possible to take off a question on, whether cub will punch it – the events simply will not reach to it, the embryo will suffocate in egg.   
In general, the egg is the surprising object from the point of view of physics. Its durability is provided not only by durability of the shell, but also by the shape of egg. When the hen (turkey, ostrich or Aepyornis mum etc.) is hatching eggs, her weight is allocated along the shell surface. Equally effective of these forces, directed inside of egg perpendicularly to its shell, appears insignificant. But the force of the hatching chock enclosed from within of the egg vault, easily will break the shell. Therefore it is not necessary to be afraid, that the cub will not punch egg shell.  
Hereditary inclinations of toraton are not so favorable for fast growth. That to increase weight up to 6 tons (as at the elephant) for 30 years (according the book, in the film the age of five years, necessary for it, is noted), the 10 - 12-kilogram cub should add about 0,57 kg per day. Can the turtle, even very huge one, grow according such rates? Whether becomes the carapace a handicap to it? Growth of any bone, including carapace bone, consists of opposite processes of destruction and increasing. Thus the bone can grow, not changing the form and almost constantly keeping proportions. Whether can the bone of toraton, especially young one, be updated so quickly? I think, no - toraton belongs to cold-blooded animals and its physiological processes are slow. And at the small cub of toraton fluctuations of the body temperature are more significant, than at the adult one. Dinosaurs, its approximate analogues, according data of structure of bones, were nevertheless warm-blooded vertebrates.  
Certainly, the probable exit from the created difficulty is to assume the live-bearing of toraton. The live-bearing animal can give birth to very large cubs due to active supply of the embryo by oxygen from an organism of mother. But also it is necessary to remember that turtles are very conservative group of reptiles. They exist on the Earth from Triassic period, but no one species of turtles is live-bearing, while snakes and lizards (and among extinct reptiles - ichthyosaurs) freely can give rise to alive cubs. Thus it is necessary to take into account, that lizards are known from the Permian deposits (“coevals” of turtles), ichthyosaurs had appeared in Triassic and practically at once had become live-bearing, and snakes are known from the Cretaceous period – it is most young group of reptiles, and in it already there are many live-bearing forms. As we see, turtles had a lot of time for development of live-bearing as way of reproduction, but they have not taken advantage of it. Therefore I think, it is useless to wait, that during the nearest 100 million years turtles suddenly will become live-bearing. On the contrary, at increase of the contents of oxygen in atmosphere, temperature and humidity of climate benefit will be received just by egg-laying species. The live-bearing at reptiles is the adaptation to extreme conditions: it is known, that the same species of lizards in warm valleys and foothills can be egg-laying, and in cool mountains - live-bearing. An adder (Vipera berus), the unique species of snakes living behind Northern Polar circle, is live-bearing! And the giant toraton, undoubtedly, can not become live-bearing reptile in conditions of eternal tropics of the Earth of the future.  
Group behavior of toraton is also rather doubtful fact. Certainly, we don’t know traces of fossil turtles proving the gregarious habit of life of these animals (it is known for dinosaurs), but no one modern species of turtles live in herds. Certainly, at the rich fodder site some turtles gather at times. But few animals, and even some tens animals are yet not a herd. Elements of herd are hierarchy (here there is a leader and subordinates), system of the communications, including poses of domination and submission, organization. The herd is more, than simply group of animals. The herd is original “super-organism”. And whether are turtles with their, to put it mildly, not so remarkable intelligence capable to create such herd? Certainly, the answer is: “no”. Therefore the family group of toratons, searching for the lost cub, shown in film, is a purest imagination.

***The swampus – it hadn’t looked before the leap to the land.***

Swampus is at the same degree unreal creature, as well as toraton. I do not deny that water animals can adapt to rather long existence on land. An example of that is literally before our eyes. Snail Ampullaria, usual aquarium species of snails, creeps out to land for egg laying. But whether can the octopus repeat its feat? I think, it is absolutely impossible. Octopuses (as, however, all other cephalopods) have not developed even fresh and salted waters for all millions years of existence on the Earth (They had appeared on the Earth, according the fossil record, in Cambrian period, about 550 million years ago, it was enough time at them). Is it necessary to speak here about development of land? There is one colossal obstacle which cephalopod still had not overcome - it is the water salinity. It is known, that in Black Sea there are no species of octopuses though the climate here is quite favorable for their life. But a saltness of the Black Sea water of 15 ‰, whereas at ocean - 35 ‰. It also is that barrier.  
The mudskipper (Periophthalmus spp.) is given in film as argument of that sea inhabitants can live on land. But the fish is nevertheless not the octopus. The mudskipper can live both in salt ocean, and in almost fresh water: its kidneys work by other principle, rather than at the octopus. And endurance of the mudskipper to salts also has determined its success in survival: it had taken advantage (in evolutionary sense) of that chance, which frogs obviously could not use: amphibians do not endure salt water. If they slould be more resistant to salt, an ancestor of the mudskipper should not develop salt sea bogs: all habitats for a long time would be occupied by frogs and ancestors of this fish hardly could compete to them. So the mudskipper is an argument absolutely of other sort: it shows that to species can occupy a new ecological niche only when it is rather free.  
Let's return, however, to our swampus. Blood of the octopus is isoosmotic to sea water (it has an identical salinity, as it), its kidneys are not adapted to removing of surplus of water from an organism. At the same time kidneys of freshwater animals excrete from an organism huge amount of the diluted urine - up to 200 % of weight of the body (crustacean Daphnia), and even up to 400 % (bivalve mollusc Anodonta). Kidneys of vertebrates work for keeping of constancy of blood structure, removing from it in different situations salt or water. Water of poor salted bogs of the future will not have constant salinity. If to take into account, that the level of ocean in the future had risen, it is possible to assert safely, that humidity of air had strongly increased. In such conditions it is possible to expect daily rains of terrible, pernicious for octopuses FRESH WATER. Hence, the swampus (and, the most important thing, its direct, still sea ancestor) daily should be exposed to completely inconceivable test for cephalopods. And the young growth of the swampus, according the idea of film, must be reared in rain, practically distilled water! Any octopus would not sustain such mockery and would die within several hours under the down-pour rain.   
In the book it is underlined, that the female of the octopus urinates in the water reserved in the certain plant, where the young growth is reared, to increase its salinity. Taking into account features of physiology of the octopus, it is necessary to notice, that by this action it can make fresh its own blood and die: salts from water will not enter in her body instead of removed at urinating ones owing to absence of sea water on land. Besides I think that authors of the book understand clearly that to salt water and to urinate in it are two completely different things. Urine of any animal, including the octopus, contains not only salts, but also rather poisonous products of metabolism. So, at octopuses the basic product of a metabolism is the ammonia secreting as compounds of ammonium (NH4+). Ions of ammonium are very poisonous: their maximum permissible concentration in water of sea aquarium should not exceed 0,01 mg per liter. Taking into account high sensitivity of sea animals (and in particular – cephalopods) to accumulation of ammonium in water, it is possible to assume, that philoprogenitive mummy simply will poison its own posterity, having decided “to salt” water in the plant crown by so unpleasant kind. Therefore the hypothesis of authors of the book does not solve a problem, and simply translates it from one channel to another, not removing it completely.  
Certainly, it is possible to assume, that in connection with an output(exit) on land the marsh octopus instead of ammonia an end-product of a secretion will have, for example, urea (too poisonous) or a uric acid. However, taking into account the big conservatism of cephalopods in the past (500 million years did not change an inhabitancy, and so, and), it is difficult to admit(allow) physiology, that they can develop in the future (for less than 100 million years) other mechanism of a secretion.  
One more strangeness stated in the book - features of breath of the swampus. To be more exact, to this creature ability to live on land during four days, using the oxygen reserved in water, is attributed! And how else to understand the following information:  
“It can not is high-grade breathe by atmospheric air and lives due to the limited stock of the oxygen, which had been saved up in tissues and blood. As soon as these stocks are exhausted, the animal again should plunge into water and sate blood with the oxygen dissolved in it”.   
“Swampus is capable to live on land about four days in succession...” (“The Future is Wild”, page 82)???  
And literally on the next page very much advanced intelligence of marsh octopuses is described. And the intelligence is the product of activity of the advanced brain which, as it is known, is very exacting to oxygen and has not got used to stay at “short rations”. Can the 20-kilogram octopus really save up in the body enough large amount of oxygen for independent existence and additional charging of large brain?  
It is not clear, why the swampus can not breathe using skin, similarly to the frog and the mudskipper (which, I remind, is shown as the certain analogue of the swampus). It is rather favorable: in the atmosphere of the future there will be more oxygen, than now is (authors of the book and film repeatedly speak about it), and this amount obviously is more, than in water of bog where except for the octopus other creatures, and also rotting plants consume oxygen. And skin breath or formation in pallial cavity of animal the analogue of lungs (similarly to change of gills at overland crabs and Birgus crustacean) could become way out for this new immigrant. But authors, probably, had considered it unnecessary.  
Remembering about the scientific approach which is declared by authors of the book and film, it is necessary to remember the principle of pre-adaptation, known in biology:

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| The principle of pre-adaptation is, that organisms occupy all new ecological niches (at their occurrence) due to presence at them the property of genetic pre-adaptation. It means that ability to the adaptation at organisms is incorporated “initially” and is not connected directly to their interaction with the habitat. Such ability is caused by practically endless of the genetic code and because of it - the information in genotype of any of organisms. |

In other words, organisms beforehand, by virtue of genetic reserves of the population, have the greater or smaller amount of attributes, allowing to survive at change of the inhabitancy or to occupy actively any new environment. Such example can be seen at the animals developing land in Paleozoic era. Arthropod had strong shells protecting them not only against enemies, but also against losses of water from the organism. Durability of the shell (it is an external skeleton) allow the animal not only to protect itself against enemies, but also to keep the constant body shape on land. Segmented strong extremities allowed moving there, where pushing out force of water did not help to support the body. The crossopterygian fish already **before the land developing** had lungs, powerful flipper-like fins and strong internal skeleton. Its scales were developed as the adaptation for protection against predators, but it perfectly protected the body against drying up. Its kidneys did not allocate the certain amount of salts from the organism, and worked for maintenance of constant chemical structure of blood; they could not only excrete out, but also keep in body salt and water. Such features already available at animals up to land developing, also had allowed them to make a step through the edge of water.   
Fishes had not cast by hundreds ashore and had not dry up there in the insuperable desire to develop land, which has gushed over them, as creationists try to present this process. Not all fishes, but only that species, which, perhaps, were anatomical ready to it, had expanded to land habitats.  
Not always such step is made by most progressive forms: cephalopods in Paleozoic were more active and intellectually advanced, rather than fishes or arthropods. But at cephalopod during the process of evolution the reduction of an external and internal skeleton (up to its full disappearance at modern octopuses) had taken place. Their single-layered covers of body had not protect against drying up (and what for is it? Cephalopods lived in the sea, and the sea dries up very seldom). Their kidneys could not support constant structure of blood (and what for is it? Sea water is very stable: its structure appreciably varies only during huge time intervals - hundred millions years). Therefore it is possible to draw a conclusion that fishes and arthropods had been more pre-adapted to life on land, than the octopus. They had adapted to life in more changeable conditions, and resistance to changes of environment had allowed them to expand to land; and cephalopods at all their intelligence could not and can hardly make that. Hence, the way to the land is prohibited to the swampus and its followers.  
In view of these reflections it is clearly, that such animals as elephant-shaped megasquid and agile squibbon, presented in following series of film and chapters of the book, simply could not appear. Besides octopuses (including the swampus) and squids (including the megasquid and squibbon) belong to completely different groups of cephalopods (octopuses are members of the order Octopoda, and squids – of order Theutida). Undoubtedly, at swampus in film and book 8 tentacles are well appreciable; and at the megasquid and squibbon 10 ones are shown. Hence, they are representatives of completely different orders of class. How big is the probability of that great “break” to land (very large and essential evolutionary transformation) was made independently from each other and in parallel to each other by representatives of two different groups of one class? It is practically zero. Besides the basic line of evolution of squids is directed to the adaptation to pelagic and plancton habit of life (The Russian scientist, the expert in cephalopods Kir Nazimovich Nesis considers so), but not to the way of development of littoral zone and salt sea bogs from which it is possible to make “jump” to the land as it was made by crabs. Hence, the octopus in swamp and the squid in forest is practically the same, as the mammoth tree at the ocean bottom and the giraffe in Himalayan Mountains.

***“Swampus cradle” – can it live in swamp?***

The plant which is shown in film and book as "cradle" for young swampuses, is also interesting. I do not contest, that such plants are present in our time: they are the representatives of family Bromeliaceae living in America (1 species is known from Central Africa). In axils of their leaves water is collecting, and there various organisms use. Among the population of leaf axils of bromeliads there are larvae of mosquitoes and midges, and also carnivorous water plant Utricularia nelumbifolia. And forest frogs Dendrobates rear tadpoles in leaf axils of bromeliads. Therefore I do not contest that the union of animal and plant shown in film is real: such cooperation is present in the modern world. Another thing surprises: how **the water-STOCKING** plant appeared at the swamp? In what the biological sense of such phenomenon consists? In the case of bromeliads the sense is clear - the epiphytic plant lives on branches of tree and reserves water from rain up to rain. The adaptation for stocking of water had been evolved not in marsh, but rather in dry conditions, when there is no constant access of roots to water. In constantly damp ground of swamp the strategy of stocking of water is senseless – there is enough water here, and the water-bearing layer is not deep from the ground surface. According the outline shown in film, at the plant there is the well-advanced main root reaching deeply in ground (bromeliads do not have main root, as all Monocotyledones). It allows assuming, that the plant is well supplied with water with the help of roots. Had this plant evolve during millions years as the “cradle” for young swampuses? You see, the evolution does not have any certain ultimate goal.

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| **Phantom voyager** |

***The devil is not too terrible, as it is pictured... Even sea devil is.***

One of characters of this chapter (and series of film), devoted to rich life to the shallow seas of all-planet tropics, is the creature resembling the water beetle, slug and sea turtle simultaneously - the swimming mollusc named “the reef glider”. This is the creature with streamline torpedo-looking body and with three pairs of blades similar to flippers of sea turtles. In opinion of authors of the project, such creature can evolve from modern nudibranch molluscs plentifully inhabiting sea from tropics up to polar altitudes. It is possible to agree with it, because now there are similar creatures in the pcean, for example, bright red nudibranch mollusc “the Spanish dancer” moving in thickness of water, wriggling flat body. And another nudibranch mollusc, Glaucus, also most likely is the direct ancestor of reef gliders of the future. I am prone to think so because of character of relations of Glaucus and one more inhabitant of modern ocean – coelenterate Physalia.  
The main character of this chapter (and series of film) is giant siphonophore, similar to huge sailing vessel – “the sea phantom”. And large reef gliders eat poisonous feelers of this giant, just as in the modern sea the Glaucus mollusc regales itself with feelers of Physalia, which one touch, by the way, will suffice to send the man to the kingdom come.  
But authors of the book, describing features of the reef glider, had once again let themselves down by excessive detailed elaboration. In particular, to the reef glider the feature haв been attributed which makes completely impossible that habit of life, which is attributed to this creature. Buoyancy of this creature they explain by the thesis, that in the body of this animal ions of ammonium are collecting. In itself this feature is not supernatural and phenomenal - at ocean now so-called “ammoniac squids” (Cranchiidae) live. Their buoyancy just also is caused by accumulation of ions of ammonium in the special float bag. But the difficulty consists in very small efficiency of such mechanism. According to the Sovet expert in cephalopods Kir Nazimovich Nesis, for maintenance of buoyancy of such squid to each cubic centimeter of muscles of this animal 2 sm3 of volume of float should be present. “Ammoniac squids” have in this connection the appropriate shape - their bodies are very friable and delicate. According the supervision from underwater devices, these deep-water creatures are very inactive - they float reluctantly and usually hang in thickness of water, having stretched in sides their tentacles, expecting, when catch itself will stumble on them.  
However the reef glider from seas of the future is an active predator; it is fast and dexterously swimming. In the book the size of this creature is simply called “the seal-sized”, that, but weight of this creature is precisely specified in film: it is more than one ton. It is easy to calculate, that from this weight the weight of float (not muscles, and an ammoniac solution) will contain about 700 kg. Subtracting weight of connecting tissues, isolating this float with poisonous contents from tissues of body, weight of digestive system, sexual glands, heart, nerve and blood systems and skin, we receive very insignificant size which muscles form. Certainly, in water the bulky body of the reef glider weighs practically nothing - pushing out force of water will counterbalance it. But the other problem is staying unanswered - resistance of water, which is many times higher, than in air. The reef glider has rather wide "physiognomy", therefore I risk to assert, that force of muscles of this animal will not suffice to move its body in thickness of water gathering big speed which is attributed to it by authors. Besides nudibranch molluscs already today have not skeleton in the least: they do not have shell. Therefore strong muscles of the reef glider simply will not have the reliable support, and efficiency of their work will fall. And formation of support like any gristly plate will demand increase of volume of the ammoniac float, which will “pull follow itself” the increase of the body size and frontal resistance, which will demand besides increase of force of muscles. Force of muscles lags a little behind increase of the linear size of the body - when the length of muscles is increased N times, their force increases proportionally to their section N2 time, but the volume and weight – N3 times. And the big volume increases frontal resistance. Any "vicious circle” is forming…  
It would be most logical to assume, that buoyancy of this animal is determined by the high contents of fat in body tissues (as at sharks and whales). It would give an animal much more benefit in comparison with variant of the “ammoniac float”: fat is an energy source, and the body becomes much more dense and more mobile. Besides fat is not poisonous and can be accumulated not only in isolated “float” but also can impregnate muscles, to accumulated in body cavity (at whales fat impregnates even skeleton bones). Some modern squids use this way, not losing their mobility.

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| **Antarctic firebreather** |

***The forest albatross: the ice breaker in desert from the point of view of evolution.***

A series devoted to tropical rainforest of Antarctica of the future, perhaps, is the most colorful in whole film. Violence of life of tropical forest is shown skillfully. But the scientific side of this series, in my opinion, strongly “limps”, and it is on its last leg.  
Certainly, it is tempting to imagine the bird shooting at the enemy by hot poison. As there are birds using **spittles** to the enemy as the weapon. They are birds of order Procellariiformes - albatrosses, stormy petrels and others. At the case of danger they spit to the enemy jet of stinky fat liquid. It seems, a little bit of imagination - and yellow-orange dragon bird, shooting to huge insects by heated poison, is ready. But it is not so simple in this world.  
Fire-breathing bird of Antarctica synthesizes its “detonating mix” of chemical substances received... from plants! **A question:** how the union of bird and tree, evolved up to such extreme degree, had began? **The answer:** earlier the bird had a certain interest to contents of flowers, which was not connected to synthesis of active explosive chemicals (The bird had not guessed what can be received from flowers! It is not intelligent and has no analytical thinking). And what, except for chemicals, can involve the bird in flower? Really the bird had put beak in flowers and licked their contents simply for the sake of idle interest, passion to experiments or with insuperable desire to help the certain tree to be pollinated? I think, no. For a bird (butterfly, beetle, bee, bat, possum, lemur) pollination of flowers is only collateral action. The flower interests them only as a source of the certain necessary substance for life - usually food, fine high-calorific nectar. And most likely, the plant in the beginning had acted so, supplying birds only by nectar. Then the part of collateral substances contained in nectar has began to be used in the process of synthesis of chemicals, and further process of evolution in preferences of birds has resulted in formation at the plant chemical “Molotov’s cocktail” instead of nectar. It looks, everything is all right... Except for one fact.  
What event had stimulated carnivorous birds of group Procellariiformes to pass to more problematic for digestion vegetative diet? You see Antarctica of the future has not lost coasts, they are still great (and even had became more, you see under ice of continent some latent islands, whose shore line summed is longer, than at modern ice cover). Birds of this group are specialized for feeding by sea food - from fishes up to plancton crustaceans and spineless animals. And their specialization can not turn back - it is the infringement of rule of the progressing specialization formulated by Ch. Deperet:

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| The group which has followed the way of specialization, as a rule, evolves by the way of progressing specialization. |

I could imagine different descendants of modern Antarctic Procellariiformes: small, similar to gulls, albatrosses catching river fish in the rivers of Antarctica of the future; the stormy petrels being analogues of halcyons and water ouzels (Cinclus), catching tiny fishes and insects in streams; stormy petrels and mother Carey’s chicken with beaks similar to beak of Pterodaustro pterosaur, catching crustaceans in mountain lakes and in salted lagoons of Antarctic tropics; flightless stormy petrels similar to penguins and great auks - fishers at the coast of Antarctica. All these birds are specialized variants of vertebrates eating water animals. But I can not imagine a herbivore evolved from albatross or the stormy petrel not because of absence of imagination. Simply it is possible to turn process of evolution to the return side only in fantastic films.  
I do not want to be groundless. There is presently a place on the Earth which can be shown as provisional model of relations of tropical forests of Antarctica and albatrosses not inhabiting them. This place is Hawaiian islands. Certainly, it is not the continent, but these islands are rather great to support not only one species of birds, especially small birds. Albatrosses, stormy petrels, mother Carey’s chicken meet and nest at Hawaii. But all of them are connected by their habit of life to the sea. Undoubtedly, that these birds had nested at Hawaiian islands before islands had become covered by magnificent rainforests. In general, they had been among first settlers of these islands. It means, they had a lot of time to adapt to inhabiting in formed forests of Hawaii. According this idea, ancestors of modern Hawaiian honeycreepers Drepanididae should meet significant competition from the part of forest descendants of albatrosses and stormy petrels and to not develop at all forests of Hawaiian islands. But no one albatross had become forest inhabitant despite of attracting affinity and free ecologically niches of the Hawaiian forests. Some water birds had developed ground biotopes of Hawaiian islands. They are modern nene, or Hawaiian goose (Branta sandvicensis) and extinct huge anserine birds known by their fossils. Is it the chance for them? No, because ducks and geese are herbivorous birds, as against albatrosses and their relatives. It is more easy for them to adapt to ground conditions of life and the food given by forest.  
Differently, remarkable forest hummingbird albatrosses of Antarctica are the next absolutely unreal course of evolution which can remain only in our imagination.

***The “chimerical creature” of the world of insects – the falconfly.***

Awful insect of the Antarctic tropics of 100 million years in the future is the terrible predatory insect falconfly. The shape and habits of this insect are rather furious. However the family tree of this monster appears the extremely confusing from the point of view of the fact that both in the book, and in film the “ancestor” of this animal, **the sand wasp Ammophila** from hymenopterans order, is clearly named. We shall remember this fact, it will be useful to us.  
If to look attentively to superb made photorealistic illustration (page 92) of the hexapod predator, the surprising feature will be found out: at the last segment of thorax, before an abdomen, two small “tacks” are visible. And they do not allow to make connection of relationship between the wasp Ammophila and falconfly. The matter is that from the point of view of biology these organs represent a pair of reduced wings - halters. And they are absolutely not characteristic for Hymenoptera, but are distinctive attributes of other order of insects - two-winged flies (Diptera) at which they serve for maintenance of balance in flight. The structure of wings of insects is very stable and important attribute which is essentially not varying during millions of years. Systematization of insects also is based on it, simply enough to recollect names of groups: Coleoptera (“rigid wings”, beetles), Hymenoptera (“membraneous wings”, wasps, bees, ants), Diptera (“two wings”, flies, mosquitoes), Lepidoptera (“scaled wings”, butterflies and moths), Trichoptera (“hairy wings”, caddis flies), Neuroptera (“net wings”), Strepsiptera (“fan wings”), Hemiptera (“half(-divided) wings”), Homoptera (“equal wings”), Orthoptera (“strait wings”, grasshoppers and locusts) ... The opportunity of transformation of back wings of the wasp to halters is absolutely unreal: wings of wasps are specialized in other direction - forward and back wing from each side are linked between itself by tiny hooks and work as a unit. Transition from the wing to halter is possible only from more primitive condition, when both wings are not linked. But evolution is irreversible: to become simpler up to an initial condition of an ancestor of insects covered wasps, hence, the back wing is not capable can not turn to halter too.  
Hence, we will come to recognize, that **the falconfly can not be the descendant of the wasp Ammophila and the representative of hymenopterans order.** It is the two-winged insect according the structure of its wings. I shall explain for non-specialists that the difference between hymenopterans and dipterous insects is more, than between the cow and the horse.  
But there is an objection against this conclusion, which monstrous falconfly carries on the head: its jaws. If according the structure of wings the falconfly is typical representative of Diptera, its jaw structure nevertheless shows in it the representative of hymenopterans. At all two-winged flies the mouth is specialized: at flies the lower lip has turned to licking pillow; everyone had convinced in this fact more than once, observing for the fly bossing on the piece of sugar. It waters food with saliva, and then dunks out by lip got “broth” (Have I spoiled appetite to anybody?). Jaws at the fly have disappeared practically completely. But at relatives of flies, horseflies, jaws were kept and also cut our skin when this creature attacks delicate non-sunburnt back of the summer resident gathering strawberry. The oral organs of the horsefly are cutting and licking: jaws only cut skin, and this creature sucks blood with the help of a lower lip (however, its sting did not become more pleasant after this information). And at mosquitoes the oral organs are sticking and sucking. I think, everyone had tested at itself its action. The proboscis of mosquito is not integral - it is combined by two pairs of very thin jaws in “case” formed by top and bottom lips (by the way, at the butterfly the proboscis is formed from the lower lip, and jaws at the majority of their species had disappeared absolutely). In other words, two-winged flies are “experts” of liquid food consuming.  
And at the falconfly we see powerful gnawing jaws, capable to crush bones of unfortunate birds of Antarctic tropics which has fall to it for dinner. Also I think, that the most experienced reader of these lines will draw conclusions on relationship of the falconfly of the future with **modern** two-winged flies if I shall tell, that gnawing jaws are primitive by the structure. They meet at the most ancient by origin orders of insects on the Earth - cockroaches, beetles, orthopters (recollect grasshopper and locust), soothsayers. So, according the jaw structure the falconfly is not two-winged fly, though by the structure of wings it is the most typical representative of this order.  
My former classmate has to found at this monstrous creature one more feature which at it simply can not be. In the book on the picture it is clearly visible, that on the end of falconfly’s abdomen… cercuses stick up! These outgrowths are rudiments of abdominal extremities. They are characteristic for primitive insects. Such outgrowths are at cockroaches, soothsayers, grasshoppers. But they are not present at insects from progressive orders - butterflies, beetles, and also at hymenopterans and two-winged flies among which it is possible (?) to search for an ancestor of the falconfly. These cercuses could not appear at it – the return to attributes of ancestors is impossible.  
That is why this creature appears the chimera of the world of insects. And similarly to the most part of creatures shown in the project “The Future is Wild”, it passes from the category of real creatures to the category of the “pseudo-scientific fantasy”.

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| **Silken assassins** |

***Illusive chance of cranes.***

Creators of film “The Future is Wild” had very generously “sown” the devastation in ranks of modern animals. So, it is underlined in the series “Ice age warriors”, that all sea mammals had become extinct because of human activity. If human had become so reckless, that it exterminates big and various groups of animals standing at top of the evolution, what can we speak about ancient groups of live creatures, whose "Golden Age" was finished, when man still had not appeared on the Earth? One of such groups is the order Gruiformes among birds. Cranes can not survive at intensive “reforming-destructive” activity of people, because these birds are strongly subject to anthropogenous influence. They can not survive in anthropogenous landscape, at strong anxiety, at destruction of natural habitats. If according the idea of film sea mammal had become extinct, cranes should die out with the even greater degree of probability. And if there are no cranes - there should be no fine dark blue bird with wing-shaped legs.  
There is one strangeness and in life features of big blue windwinger. It is known, that its “ancestors”, cranes, are nidifugous birds. Their chick hatches from eggs well advanced and quickly leaves nest. It actively studies to search for forage and fast becomes independent. But in film the fledgling sitting in the nest (already big and fledged), to which parents bring forage, is shown. It does not correspond to features of behavior of cranes and more resembles nidicolous birds: passerine birds, woodpeckers, owls, predatory birds and albatrosses. It is more logical to assume, that the nest of big dark blue windwinger will be in gorge, is closer to sources of forage (colonies of spiders) and in the zone of strong winds. Then the chick itself can search for food in colonies of silver spiders and will study to fly, using gorge as an original wind tunnel.

***Poggle – is it the declining of mammal history?***

In film “The Future is Wild” professor Stephen Harris had advanced the strange hypothesis that now mammals have not best times and in the future they inevitably should disappear completely almost. Say it again, Prof. Stephen Harris! Especially say it then, when you will exterminate mice and rats in the cellar, or drive squirrels from garbage containers. Aussies seriously can contest the opinion about the mammal “degradation”; it is especially concerning mice and rabbits. So, in the serial “The Crocodile Hunter” zoologist Steve Irvin got from the old equipment at the farm live mice by handfuls! And their neighbours the same time as if the alive carpet had scurried under legs of the film crew. Also think, who is in endangered condition - mice, or... people?  
At mammals there will be greater future, than it is shown in film. In any way it is impossible to agree with words of Professor Stephen Harris that after 100 million years mammals will appear at the edge of extinction. They have already passed hard exam of survival rate during the evolution. More than 120 million years they were neighbours of dinosaurs, but had not died out, though they were obviously not at the top role in ecosystems of the Mesozoic Earth. And even during mass extinction at the end of the Cretaceous period they had survived, though they had some losses (some orders of Mesozoic mammals had become extinct together with dinosaurs). Why should they degrade in the future? There are no objective reasons for it. Certainly, such mammals as elephants and other large hoofed mammals, large predators like tigers and bears, highly specialized forms like anteaters and pandas, will be doomed for extinction at the change of conditions of habitat. Changes in circulation of ocean currents can put the mortal blow to populations of whales (according the amount of fossils, they hardly was not dyed out in Oligocene) and pinnipeds. But there are also those ones, who will pass through such accidents with minimal loss. At rodents, chiropters and insectivorous mammals the future is more perspective, rather than degeneration up to spider forage; they are remarkable by fast alternation of generations, fast distribution of favorable mutations, fast speciation. And in general, species and genera of mammals replaced each other surprisingly quickly while, for example, dinosaurs of Iguanodon genus trambled down the Earth about 75 million years (all Cenozoic era lasts about 65 million years), and the crustacean tadpole shrimp (Tryops), crawling and now in summer pools, is past about 300 million years. Therefore it is possible to assert, that at mammals there are huge reserves for adaptation even at mass extinctions of species.

***“Grass tree” - the step child of bamboo.***

If you tell lie - lie! Lie more expressive, with feeling and mood! I simply can not say otherwise after final judgement of the series “Silken assassins” “The Future is Wild” watched once again at the videorecorder of the film. It had happened because sometimes I am such biting and meticulous spectator. And once again I had recollect Russian proverb “Not ever mouth will be covered by shawl” (it means, you will force to break off not every person, using brute force). Well, I can not be silent!!! I’m so angry...  
So-called “grass trees”, submitted in film as descendants of bamboo, had seemed to me interesting object for criticism. And not curvature of trunks (there are now more curve trees on the Earth), but curvature of logic reasonings at the assumption of existence of such species of plants in the future had seemed to me so much strange. Apparently, the “grass tree” was created according the principle: “let it will be so because it is simply very much pleasant to me”. I can not pick up other explanation, and that is why. I have decided to read again the scientific literature devoted to bamboo, and had found out surprising things which should not appear at the process of evolution from bamboo to the “grass tree”. I had taken features of biology of the “grass tree” from film, and bamboo features - from books. Compare and draw conclusions:

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| Attribute | Modern bamboo | “Grass tree” of the future |
| Periodicity of flowering | Once a life, through big time intervals, extremely irregular (some species flower once per more than century), and after flowering (simultaneous at big territories) there is a mass dying off of plants. | Annually. It is a perennial plant. |
| Way of seed carrying. | Animals (seeds have thick shells, strong or soft and juicy); fruit is nut-like or berry-like. | Wind: seed is small with long fluffy “parachute”. |

If to estimate these attributes from the point of view of primitiveness and specialization, it appears that the “grass tree” should not exist in general, or should not be the descendant of the bamboo.  
Regular annual flowering is a primitive attribute because many modern species of flowering plants breed so. Coniferous plants also give seeds each year many times per life. Thus, unitary flowering is the specialized attribute.  
The majority of graminoids has seeds, transferable by animals or wind. And animals carry seeds not only in intestines, but also on the body. The bamboo has features of structure of fruits which are not present at any modern graminoids even in residual condition. Seeds of bamboo species have nut-like large fruits with firm covers, or berry-like fruits with juicy pulp. At the background of other graminoids with small seeds having thorns, "parachutes" and dry film of seed covers these attributes look specialized.  
So to change from bamboo to the “grass tree”, evolution should literally “go back”, and at once two attributes should evolve from specialized condition to primitive! And it contradicts L. Dollo’s rule which says, that

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| The attributes lost by ancestors are not restored at descendants at their return to ancestral habit of life. |

Hence, the “grass tree” appears only a result of imagination, and the food chain on the Australian-Kamchatka plateau becomes an illusive Mirage... By the way, let’s speak about food chains.

***Eight-legged “farmers”.***

One more interesting episode of this series is the food chain constructed in film. Certainly, it is very tempting to imagine artful spiders had enthralled fluffy small mammals with touching black eyes and use them as food, as any aliens, colonizing the Earth. But if to count, how many benefits and losses will turn out at such habit of feeding, there will be the surprising result.  
If silver spiders eat only small mammals poggles, they should compensate all losses of energy for movement and protein expenses for spider web construction (spider silk by its structure is a protein, its producing depends directly on quality of feeding of spider) only due to feeding by small mammals. Hence, spiders should breed so huge herd of poggles that the accretion of these mammals must suffice for spider colony feeding, but thus breeding herd of poggles had to be kept. Otherwise the herd of mammals will decrease catastrophically and once last small mammals will be had eaten.  
If to take into account, that only about 0,1 part of the eaten nutrients is using for weight increase (well, all right, at spiders this amount is more, because they are cool-blooded animals), it should to draw a conclusion, that the accretion of the poggle colony should be approximately ten times bigger, than the accretion of spider colony. It is necessary to sum here losses of spiders because of hunting of big birds windwingers, loss of web which is torn both by winds and hunting birds and which should be restored. Because it is impossible to count up directly the accretion of spider colony, losses of breaks of web and predating of birds, efficiency of digesting of poggle meat by spiders by virtue of that these species have not appeared yet (taking into account the remark concerning the biology of bamboo, I can tell with clear conscience, that they will never appear), conditionally we shall accept efficiency of developing (directed to direct accretion of biomass of bodies) of poggle fibers by spiders for 10 % (it is an average indice for modern ecosystems). Hence, at equal rate of accretion of biomass of spiders and mammals the biomass of fluffy spider cattle had to exceed ten times more than the biomass of eight-legged “shepherds”.  
The seasonal prevalence of occurrence of forage for poggles, flying seeds, puts spiders to especially difficult conditions. Hence, during some summer weeks spiders should stock up the amount of seeds to feed mammals with them the whole year! If to purpose the time of fructification of “grass trees” as two months (for simplicity of calculation), to take into account, that fructification some time accrues, and at the end of season some time recesses, it is necessary to tell, that during the high season of tree fructification each day spiders should stock the quantity of forages approximately for one week! In Russian there is a proverb: “the summer day feeds during the year”. For spiders it should be correct to the full.  
Taking into account inclement Alpine conditions, on the Australian-Kamchatka plateau, most likely, not so many “grass trees” will grow. Therefore colonies of silver spiders should be placed not so close, as it is shown in film. Otherwise they will compete with each other for food for the “pets”. And the number of huge dark blue birds will be enough insignificant, and their settling will be similar to settling of modern eagles in Europe: at the wide area the density of settlement of the species will not exceed one pair at some hundreds square kilometers of area.  
But we shall return to our spiders and their domestic cattle. Certainly, in winter spiders most likely will fall to hibernation, and small mammals poggles can be awake due to their warm blood the whole year. The situation also is quite real, that they can leave spider colony, if they had stocked not enough seeds.  
And now let's take for calculations any concrete figures and we shall occupy with arithmetic.  
Let's imagine, that weight of small mammal poggle is 100 grams (as at golden, or Syrian hamster). Then larger silver spider covered with heavy shell will weigh, suppose, 300 grams as the average (young spiders will weigh less, queen is larger). We shall imagine number of colony of spiders as 500 individuals. Then their biomass will be:  
0,3 (kg) ? 500 (ind.). = 150 kgs  
Proceeding from previous reasoning, it is possible to calculate, that for one year the colony of such spiders will eat 1500 kg of meat of small mammals poggles. Taking into account, that the edible part of mammal will make about 50% of its weight, spiders should hunt and use for food 3 tons of poggles (in recalculation to their weight as a whole). If to assume, that for one year the livestock of poggles is even doubled (in view of all losses to extreme conditions, illnesses, stresses, predators, cannibalism, trampled cubs, bad parents and simply run away and lost mammals) spiders constantly should contain also breeding colony of poggles weighting 3 tons! Because poggle is tiny gluttonous warm-blooded small mammal with a vigorous metabolism, it devours and spoils huge amount of forage: for day the amount, about equal to its body weight (People have keeping hamster or mouse know as far as they are gluttonous and prodigal). That is for day the colony of small mammals completely dependent on spiders, should eat 3 tons of seeds. Hence, for one year this colony will devour about 1100 tons of seeds! If in the summer mammals can graze grass for the sake of ration variety and eat less forage, in the winter cold conditions their appetites sharply grow, therefore it is possible to count, that at the average for one year such amount of grain will be eaten (or spoiled, becoming unsuitable for food).  
Taking into account, that this amount of seeds should be gathered during 2 summer months, we receive norms of day time manufacture for a colony of spiders:  
1100 : 60 = 18,34 tons of seeds per day.  
If to assume, that in colony from 500 spiders there are 300 workers (weighting 300 grams everyone), we receive day time performance standard for one spider:  
18,34 : 300 = 61,13 kg of seeds per day!  
Whether can it work so? I think, at such rates of work updating of the colony should pass faster, than for one year! Horses die because of work, as it is known,! If to take into account also the small size of flying seeds of “grass trees”, it appears, that expenses of energy for carry of seeds from web up to crevice in rocks will be more, than the energy received by spider from small poggle, well-fed by these seeds. After such calculations, certainly, it is possible to begin to hate mathematics, but such picture turns out according all calculations.   
Taking into account the winter fodder shortage and the large size of spiders, the attack of small poggles to sleeping spiders is also probable – rodents are partly zoophagous ones, willingly including insects and spiders to ration. Therefore terrible eight-legged enslavers of big-eyed fluffies risk fall to them into dinner in winter.  
The idea of connection of spiders and mammals poggles at the hormonal level has interestingly told in the book. Hormones are good and necessary substances. But I am afraid, that in those image as it is submitted by founders of film and the book, it simply does not exist. In film doctor Leticia Aviles tries to present to film watchers, that this connection is real, but she recognizes, that spiders of the future can not change the physiology and still remain practically the same spiders know today. But there are two questions which I would like to know the answer:  
**Whether will hormones of vertebrate animal have the influence to the spider the same kind as to the vertebrate?** Between spiders and vertebrate animals there is the enormous evolutionary precipice: their ancestors had dispatched still in pre-Cambrian epoch, when animals had divided to Protostomata (to which arthropods (including spiders) concern) and Deuterostomata (to which all vertebrates concern). And hormones are complex substances of mainly protein nature differing by some specificity. Taking into account an enormous difference in physiology of spider and mammal, I can assert, that the hormone of mammal does not render due action to the spider (sexual hormones of animals will not stimulate spiders to breed). Besides such important part of life cycle as breeding, as small as possible must depend on this rather delicate interaction with other species. Therefore formation of such dependence during the evolution I think unreal thing.  
**Whether will hormones operate, if to eat them?** The doctor, making treatment by hormonal preparations, makes to the patient the injection directly in blood and tissues. And what will happen with hormones getting into the body through the stomach? I think, the same, as with other proteins: they will be digested and do not render any action. Gastric juice at once will digest them and will disturb the structure of molecule on which action of substance of protein nature substantially depends. Spiders had not invented syringe and are not able to make whey of poggle blood for an injection to the queen female that she could give posterity.  
It is really, after such calculations it is easier to me to imagine, as silver spiders catch in web and devour huge dark blue birds, and small mammals poggles live free from spider yoke under roots of “grass trees” somewhere in warm valleys. And what the dark blue bird will do on this plateau - I shall not mind it: there is nothing to entice it there.  
Such ideas were cast to me with this series of interesting, but in many respects very far from a science film... I think, I had stated them enough clearly and accessibly to understanding. If to construct the rating of unreality, this series of film and the chapter of the book simply should excel all other ones, taken together.

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| **Sharkopath seas** |

***“Flish” – the dream of intelligence gives rise to monsters.***

Certainly, there is a big temptation to imagine the future of the Earth somehow very effectively and unexpectedly. All problem is that it is impossible to confirm or deny it in any way - nobody will live up to times described by authors and will not note them their mistakes. Therefore romantically disposed producers of film “The Future is Wild” enter in film such improbable “character”, as flish, flying fish. But is so real the opportunity of occurrence of this creature? I think, this event is from number of the least probable ones.  
Anatomy of flish is rather strange. I do not deny that the fish can fly actively any time in air, using pectoral fins as wings. Such fishes are in modern fauna: they are Gasteropelecidae (from order or suborder Characiformes), living now in Amazon basin. At these small fishes the pectoral bone, resembling sternum characteristic for birds to which flying muscles are attached, is advanced. These small fishes fly really, as against more known inhabitants of sea Exocoetidae, which do not fly, and only soar above waves similarly to paper plane. Another feature is strange - being under obvious impression of flish’s “bird-similarity”, the author of this creature “had curtailed” the tail fin of flish to the angle 90° (like bird's tail). But tails of flish and bird are not homological structures, they develop from different primordiums! The tail of any bird consists of feathers having dermal origin. It is not connected to any elements of backbone of bird. The tail of flish is the derivative of the fish tail fin, it is formed not only by fin rays having dermal (skin) origin, but also by top and bottom shoots (processus spinosus) of tail vertebrae. Hence, to admit, that the tail of flish is horizontal, means to admit, that the tail department of flish’s backbone had revolved at 90°. How to imagine the transitive form from usual fish to flish and its habit of life - I can not imagine it absolutely... The tail of such fishes as a flounder, certainly, is located in horizontal plane, but also the body of such fishes lays at the side! The flying creature flish is normally orientated in space, but its tail is turned aside. Besides, the applicability of magnificent back fin on the back of flish is completely not clear. What for is it necessary for flying creature? Were, certainly, pterosaurs such as Pteranodon, Tapeyara, Thalassodromeus with huge bone “crests” on their heads, serving for maintenance of balance in flight, are known, but these crests were high and short. The fin of flish is low and long - it reaches along all back. It is obvious not the rudder and not the balance organ. What is it? Is it an atavism? Or is it the investigation of wish of the author of this monster to emphasize the “fish origin” of flish?  
Tail is not only thing that sets thinking about the nature of flish. The biomechanics of flish puts one more insoluble problem: such animal is not able to swim. Authors of the book assert, that flish can sit on water and swim, having lifted pectoral fins as sails. Also they explain buoyancy of flish to fact, that on the chest of this creature there will grow the fat pillow, and lungs and hollow scales will give to it additional buoyancy. Abdominal fins will work as keel, not giving this animal to turn over. From the point of view of the biomechanics such monster will be steady only in shallow puddle if it will thrust abdominal fins in bottom. On water surface it constantly will turn aside. Flish is not a duck. At the duck heavy intestines and legs (centre of gravity) are located below the “waterline”. And at flish the bottom part of body on the contrary, is too easy. Its abdominal fins are small and easy, and the pushing out force working at the pectoral fat pillow of flish, will counterbalance their weight. Lungs of monster also are located below the backbone. But the body of the monster has a high back fin (it is completely not clear, what for is it) and, according the body shape, strong back muscles which are heavier than fat pillow below. The bottom of flish is too easy. Accordingly, the centre of gravity at flish is above "waterline" of the animal sitting on water surface, and under influence of Earth gravitation it constantly will aspire to occupy the steadiest position - below. Thus the poor animal, sitting on waves, will constantly overturn, that will be promoted in significant degree by the wind blowing in pulled up fins. And the high and narrow body of the monster in any way will not prevent the “onboard roll”.  
If to analyze the habit of life and its connection with physiological processes in organism, it appears, that flying creatures are animals with high intensity of these processes. Birds, chiropters, and, probably, pterosaurs (on some samples of Sordes pilosus there is something similar to wool, that, probably, testifies about warm blood of it) are those. Insects are tiny creatures, we shall not take them into account as their expenses of energy for flight are smaller, than at large vertebrates. Flish in film is the large flying creature, and, by the staff of film, it flies actively, long time and quickly. Hence, its power should correspond to the habit of life. The body of flish is covered with scales - hence, it does not develop heat (there is nothing to lose and to keep) and has an ambient temperature, or develops it so many that flish can die of overheat. But last assumption is incorrect, because in nature there is no such wastefulness. Hence, flish is the cool-blooded (ectothermic) creature. It means, that its body develops not enough heat. Hence, physiological processes in it proceed slowly. Hence, the animal flish should not fly actively! Now on the Earth there are some “flying” ectothermic creatures - flying frog Racophorus, lizard Draco volans, even some forest snakes. But these animals do not fly actively - they only make gliding jumps. Energy of modern “flying fishes” Carnegiella, Gasteropelecus, Thoracocharax suffice only for some meters and seconds of flight. I shall remind that ocean “flying fishes” are passive flyers, “glider pilots”. Their energy consumptions are reduced to some seconds of active work by tail before “free-fall jump” above waves.  
Having read the book (I shall remind, that it had taken place after film watching), I nevertheless have to found a mention about thermoisolating system at flish (“The Future is Wild”, page 116):  
“Similarly to ancestors, flisher are cool-blooded, and they also are compelled to keep body heat with the help of hollow scales, covering wings muscles”.  
Such statement of question forces me to rise my eyebrows surprised and to not lower them long time. The matter is that cool-blooded (it is more correct to say “ectothermic”) animal receives heat from an external heat source: the Sun. Amphibians, reptiles, fishes, invertebrates are ectothermic animals - all their vital processes depend on ambient temperature. And all these creatures have adaptations for absorption of sun heat. So, the chameleon darkens, lizards and snakes creep out on the heated up stones, and fossil reptile Dimetrodon had on the back the huge “sail” formed by extended upwards shoots of vertebrates and fitted by skin. Same “sails” were at dinosaurs Spinosaurus, Altispinax, Ouranosaurus, and at amphibian Platyhystrix which had been not connected to them by direct relationship. Fishes can adjust body temperature by more primitive way: choosing cold or warm layers of water. Some ectothermic animals can be warmed up at active muscular work, but only at some degrees relatively to environmental temperature. Working by wings, bees and bumblebees are actively heated, and among vertebrates tunas heat themselves. But their heating nevertheless is inessential and can not allow thinking them truly warm-blooded ones.   
If to imagine flish, flying in air at temperature +25°С, it is possible to assume, that its temperature will rise to the maximum up to +29… +30°С. However at birds the body temperature is much higher – it may be up to +39°С, and for different species of bats values of temperature from +34°С up to +40.5°С are specified. It seems that the difference is not so essential. But no means is present! The matter is that in chemistry there is **rule of Vant-Hoff – Arrenius,** which says, that **rise of temperature up at 10°С results to 2 - 3-times acceleration of chemical processes.** Also biochemical processes partly submit to this rule. The temperature is limit here - temperature, at which protein keeps its properties. The matter is that at high temperatures complex structures of proteins and the active centers of their molecules start to dissociate, and they can not any more carry out the role in biochemical processes.  
And the difference of temperature flish and birds is just those required 10°С! I think the conclusion about difference in physiology of flish and birds anyone can make without any assistance.  
Receiving heat from external sources, live creatures have no thermoisolating covers. And warm-blooded mammals, birds and, probably, pterosaurs, have (or had) natural “clothes” - wool and feathers (for pterosaurs as I had already told, there are indications at finds of prints to hair-like formations at small species, however the nature of these formations is the subject of discussions). It is connected to necessity of protection against overcooling, because their organism normally works only at high temperature. And the frog covered with wool or feathers, will face to giant difficulties - it can not be heated up on the sun. The wool or feathers do not heat as themselves - they only help to keep produced heat by body. Therefore the ice-cream which has been wrapped up in fur coat, stays cold more long time than at the sun. Flish with hollow scales, designed to provide the thermoisolation, is the same feathered frog or ice-cream in fur coat. This animal will not manage to develop the necessary amount of heat to move actively (this is the “cool-blooded”, to say other words, ectothermic animal), and thermoisolating scales will prevent solar heat to reach an organism of flish. And here is the paradox.  
One more physiological problem, with which flish will face during flight, is breath. Looking at appearance of flish, I can suppose that gills are partly breath organs of this creature. Partly it is favorable - air, the carrier of oxygen passes through gills by continuous stream while in lungs it changes direction during breath and exhalation. But it carries one problem: air is not water, at passage of air stream through gills the epithelium of branchial petals simply will dry up and will stop the participating in process of breath. Flish will simply suffocate in flight. Certainly, it is possible, that flish has the special modified swimming bladder for air breathing. Indirectly it is specified by such flish feature, as voice (at least, scenes of life of these creatures are accompanied by the hoarse cries similar for voices of had taken a cold gulls). You see gills can not give the air jet used for sounds producing. However the active habit of life demands such amount of oxygen which “lungs” of flish can not give first, because of imperfection of breathing organs, and second, because of imperfection of the mechanism of breath and exhalation. At us, ground tetrapods, breath is carried out due to movements of thorax. At fishes thorax is not present, their ribs do not connected with each other. Hence, “lungs” of fishes will not cope with submission of the necessary amount of oxygen. Drying gills and weak “lungs” are not best assistants to the active flying creature...   
Authors had put themselves in the extremely awkward position, rather carelessly having opened ruses of family tree of flish: the ancestor of this creature, according to the book (in film ancestors of this animal have delicately held back), appears... the cod (to be more exact – “fish of cod family” (page 126)! And it completely deprives flying creature of the right of existence because of two reasons at once: **first,** cod is bottom-dwelling fish. The barb on the chin of fish is necessary for search of catch on oozy bottom. Accordingly, specialization of cods most likely can go in the future to the way of more complete adaptation to bottom habit of life. It is difficult to imagine, what reasons push the cod to change habitual environment. Its fins are short, and the body is very much extended – it shows in it not so good swimmer, it is difficult for these fishes to live in top layers of water, constantly and quickly moving. Therefore most likely, it will not begin to adapt to pelagic habit of life. And **the second objection** follows directly from the first one: at cod fishes there is closed swimming bladder which is not connected with intestines! Therefore it can not be used as the lung. And what else can be expected from bottom animal? It is no sense for cod to use swimming bladder as the organ of air breath: in the sea (to be more exact - at open ocean) sites of water, poor in oxygen, are not present and to rise from depths for gulp of air - it means to test pressure differences of water and to show itself to numerous predators of top layers of water. Therefore the precondition for development of air breath at cod and any of its relatives simply is absent. And if there are no preconditions, evolution simply will not proceed in such direction: it is driven by external factors, but passes due to internal genetic reserves of population. In general, order Gadiformes is submitted by significant amount of deep-water and benthonic species. Therefore representatives of this order “will not play” the role of ancestor of the large flying fish completely. Also I think that everyone will understand and will draw conclusions if I shall tell that the closed swimming bladder at fishes is the specialized condition, and opened one is primitive.  
And one more problem catches flish: a problem of spawning. This creature is still a fish. And it has two basic ways of breeding: to spawn eggs, or to give birth to live young flishes. Spawning breeding type is easier: it is possible to receive at once plenty of posterity and any physiological reorganization is not necessary. But it means, that flish from time to time should leave air and dive in water. And if there are flish fry (and if they were before this time, because f(l)ishes have lived up to 200 million years in the future!) – it means, it is possible to forget about presence in the sea of different species of silver swimmers - fish-like descendants of plancton crustaceans, safely. Flish fry are still fishes, and it means, that the ecological niche of fishes is occupied, and silver swimmer can not occupy it. But, as in the sea nevertheless silver swimmers of various species live in plenty, we had to recognize, that young flishes develop not in the sea. Apparently, the female flish should give rise to some enough advanced young flishes. Fishes can give rise live fry; such phenomenon meets both at sharks, and at osseous fishes. But at flish there is one problem: this creature flies; hence, flish can not give birth to numerous young animals at once. It is possible, that it will be only two (according the amount of oviducts) young flishes in pack or only one (if one oviduct will disappear as it had disappeared at birds). But the flish fry should be born enough advanced to fly at once, or flish should care of the posterity. But at the live-bearing fishes (we shall not overlook, that flish flies, but nevertheless it is still a fish), the care of posterity is reduced only to the birth of alive fry. Further it should care of itself. Besides very much advanced fry is superfluous weight for pregnant flish. In view of imperfection of respiratory system and losses of energy during flight it is possible to tell, that a bearing and birth of the large advanced alive fry is excessive loading to the flish organism.  
And this is such inconsistent and impossible creature - flish!

***The returning of sea "Terminator".***

According principles of genre in each film there should be the hero, and there should be the villain. In film “The Future is Wild” the role of the villain the creature sharkopath - schooling luminous shark - has played. But occurrence of this creature puts more questions, rather than gives any answers. I do not deny that sharks are creatures with big “safety factor”: **various groups** of these cartilaginous fishes replaced each other, existing in total from late Silurian up to present days. Generally, modern sharks are not so “prehistoric creatures” as they frequently are represented; though their family tree is undoubtedly more ancient than mammal’s or bird's one: almost all modern families of sharks have appeared at the boundary of Cretaceous and Cenozoic, only horn sharks exist from Jurassic period (but no one Silurian, Devonian or even early Cenozoic species of sharks was not kept up to now – they had been regularly replaced by more perfect species). But the question put to me by film “The Future is Wild”, is much more essential: how could they survive in general? Neither film, nor book do not give the adequate answer to this question.  
It is known, that any species of live beings aspires to grasp in maximal degree all areas accessible to life. As in the top layers of water fishes (according to film and the book) had been replaced by descendants of crustaceans, silver swimmers, it is possible to assume, that fishes in the seas **did not remain in general.** To pass development from larva or the tiny plancton crustacean up to species of rather large silver swimmer – the time is necessary for it, greater than for transformation of one species of fishes to another, occupying new places of inhabiting. Therefore, if though any species of fishes had survived, crustaceans will not see even a little bit of fish’s ecological niches. Hence, if the sea of the future belongs to crustaceans, fishes had become extinct completely. But if to assume, that sharks (By the way, they are fishes too) have occupied any ecological niche in the sea of the future, it is necessary to draw a conclusion, that they would occupy had became empty after extinction of bone fishes ecological niches earlier, than ancestors of silver swimmers. It should be remembered that sharks have posterity - small sharks. And they occupy the ecological niche at times rather distinguishing from niche of adult shark of the same species. Such case already took place in the past, in Mesozoic era: small herbivorous dinosaurs are rather rare, because their ecological niche was occupied by cubs and youngsters of large species of dinosaurs. Hence, the young growth of sharks will occupy that place, which fishes like jack mackerel (Trachurus) and mackerel (Scomber) earlier had occupied in the sea of the future. Certainly, silver swimmer can not occupy this niche at presence of such competitors - it will not have enough time for adaptation. We receive the contradiction: sharks live in the sea (there are also their small posterity), and at the same time in the sea there are different species of silver swimmers, occupied ecological niches of fishes - these facts mutually exclude each other.  
Certainly, it is possible “to lock” sharks in deep-water ecosystems and to tell, that there they will survive. Is it correct? Of course, no. Some deep-water sharks at absence of fishes in top layers of water necessarily will turn to top-skimmer fishes, if it is favorable to their survival (even because of abundance of food and full absence of competitors). And who will keep them? I can not. And second, deep-water ecosystems are not so favorable place for survival: they are even more dependent on efficiency of the top layers of ocean. It is not the refuge, and rather life by sops, because the numerous dead organisms (“rain of dead ones”) bring organic substance in deep layers of water. If at ocean “plancton Day of Doom” will happen (as Professor Stephen Palumbi had assumed) “the rain of corpses” will be first time very plentiful because the mass extinction of the majority of species of the top layers of ocean will begin. But later it will be stopped practically completely, because “above” nobody will breed owing to the full extinction. Therefore mass extinction will immediately have the effect at inhabitants of deep layers of ocean. And any shark, the large species staying at top of food pyramid, will die out with even greater probability, rather than any crustacean or the worm. Now at the bottom of ocean near to underwater volcanoes the special ecosystems, not dependent on sunlight, are discovered. But they are rather local, scattered at the bottom of ocean to big distances and their efficiency will can not provide the survival of population of large predators during hundred millions years. Hence the shark sharkopath is so unreal creature, as well as the flying monster flish.

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| **Stalkers of deserts** |

***Life cycle of the bumble beetle – the puzzle of desert.***

The large bumble beetle of wild desert of the future is original. Its life is very interestingly shown in film. But one moment has remained for the staff. Let it is not so aesthetic for the average man and causes interest of the vice police, but it is necessary to talk about it, because it puts a question to prospects of existence of the bumble beetle as the species. It is the process of pairing. It would be interesting to learn: when does it happen?  
I shall remind that the life of bumble beetle is very short. According to film, the adult insect for searches of dead animal (I had discussed the reality of existence of animal flish earlier) has only one day. For this time in the body of mother from several eggs rather large larvae hatch. But there are two questions which I can not receive the answer proceeding from my knowledge of insects (these questions had appeared at me, when I had watched the film. Book partly had answered these questions, and partly had asked new ones).  
When bumble beetles have fertilization?  
How eggs in the body of the female have time to develop only for day to rather large larvae?  
Truly, it does not interest me, what pose bugs of this species use during the pairing. Another thing represents true interest - when the pairing takes place? The life of the adult insect lasts only one day. I do not argue that life of an adult insect can last only day – May flies (Ephemeroptera) being imago live about day, and sometimes shorter. But they fly simultaneously in rich flights and are coupled at once at the first flight, and lay eggs right in water which have just left, not caring about feed of future larvae. And the bumble beetle for same time had to make many things - it must find the partner of opposite sex, to couple, the large and very much advanced larvae should hatch from eggs, but also the animal should find fresh carrion which has been not occupied by competitors. I think that it is unreal to make it during such short term. The weakest place in this chain of vital processes is the development of larvae. Because they are very large, and their organs are well developed (leaving mother’s body larvae have advanced legs, antennas, jaws and head), it is logical to assume, that for formation of such difficultly arranged body a lot of time must be used. And this time is obviously longer than the day given for life of the adult bug.  
And pairing of bugs should pass necessarily, but search of the breeding partner can be delayed: the population of bugs is scattered in desert along the mountain ridge. Even if the search of the partner will take only some hours this time will be inevitably “stolen” at the future larvae, which should develop with space speeds during the short time of life of the female.  
Certainly, it is possible to assume, that bugs develop by parthenogenesis and all individuals are females. But then the population of bugs appears not too viable. At parthenogenesis there are no new combinations of genes, affiliated individuals only diligently copy parental genotype. Any change of conditions will exterminate such species.  
It is possible to assume, that larvae during life in carrion have time to ripen and couple, and already fertilized individuals turn to the imago. But, according to film, in one dead flish only one bug lays larvae. It means that all larvae from carrion are native brothers and sisters. And inbreeding is not much better for the population, than parthenogenesis is, because with each generation homozygosity of individuals will increase and their genotype will be impoverished. It is so adverse for species, as well as “duplicating” of identical genotype at parthenogenesis.  
Therefore life cycle of the bumble beetle, in my opinion of the person without scientific degrees, concerns to so unreal things, as dwarf giants or vegetarian vampire.  
But it is possible to find the exit from such situation. It is enough to assume, that these bugs live long, are live-bearing and gather on carcasses of flishes by groups of some individuals. Then each female gives rise to one advanced large larva (it can not be developed simultaneously in its ovary any more one) on the dead animal, feeds, couples to waiting her male (it is enough one or two males for the group) and all flight will fly again - to search new sappy, fragrant, just died flish. The larvae which had been born by different females will be obviously diverse genetically. When the carcass will be had eaten, larvae simultaneously will pupate and will turn to adult bumble beetles. They will food on the rests of dead flishes, not had eaten by larvae (it will be fuller using of resources) and begin to transform these rests to bodies of the new larvae developing in ovaries. I think you will agree that such picture is more real, besides it answers many questions. But the book had read after film watching, had a little changed the course of my ideas and character of questions.  
The hypothetical life cycle of the bug described in the book, partly removes the question about the moment of pairing of insects. However this responsible task of breeding is carrying out completely not by mobile quickly flying adult insect, capable to find the female for many kilometers (by the description, his(its) sense of smell is sharper, than at the butterfly pear сатурнии which males find females on distance up to 11 kms). This major duty is assigned to the inactive larva which moves very slowly. It is unimportant, what destiny will be at the male larva after pairing. It is important that the ability to moving at it will be much less than at imago. Hardly this creature can overcome even rather small distance (some hundreds meters) for one - two nights.  
I think that dead flying fishes on natural “cemetery” will not lay as the accurate heap, and most likely the wind will scatter bodies of animals to rather big distance. Besides living on coast of ocean flish is “not more silly than the steam locomotive” and also understands by its fish brains the danger of storm. Therefore it is possible to assert that they most likely will not make heroes from themselves, rushing towards to a wind, and will hide in rocks similarly to the “silly penguin” from well-known “Song about the Stormy Petrel” written by Maxim Gorky. It is not so heroically, but is rather safe. And only separate individuals will be cast in desert (and main - in general will reach it and not plop down in mountains together with rain). Therefore the male larva will be compelled to overcome hundreds meters, or even kilometers (for the adult bug it means some tens minutes of flight), reaching up to the nearest body where the female ready to pairing is feeding. Hardly it will solve to do it in the afternoon - drying up heat of desert will kill it. Therefore the larva will spend day, most likely, having buried in sand. At night it will get out (it takes at it a lot of time) and continue travel, and in the morning it must bury itself again. For all transitions at it there are only some night hours. According such rates it will reach up to the nearest body not soon - for this time females will safely develop and also will pupate not fertilized. Short legs of larva show bad walker in it. Hence, such life cycle also is impossible.  
The exit from such situation is prompted by modern insects of order Strepsiptera, related to beetles. At some species of this group the female are connected with food and can not leave it for pairing - they parasitize in organism of other insects. But males are able to fly - they couple with females for this purpose only putting out the end of abdomen from the body of the host insect. Bumble beetle appeared in similar situation - to the moment of readiness for pairing the female can not leave food source (in this case - carrion), and the male makes it easily. Can we assume that the male simply will turn to adult insect? Then it easily will attend nearest bodies of dead sea creatures, will couple with larva-looking females sitting in them and thus will execute the duty to the nature more effectively.  
But the life cycle of bumble beetle presented in the book puts one more problem: how does the number of these species increase? If to look at life cycle of this insect, the following situation is visible: one beetle lays eggs on **one** body of carrion, from hatch **one** female larva survives (eating all other ones and the male as a titbit), turning besides to **one** beetle. That is, **the quotient of breeding of beetles is equal to one:** increasing of number of animals does not happen! And at the same time the population somehow must grow or even compensate losses of animals - losers which could not continue the life cycle. But, making a start from written in the book, I can assert safely, that it will not occur. So, the bumble beetle of the future with its fine adaptations to life in desert is the species at the edge of extinction.

***Green trapper from desert.***

Strange predatory plants with leaves similar more to mix of trap and “wolf-hole” also belong to inhabitants of rigorous desert of the future. It is possible to be surprised a long time to their smart ways of pollination and catching of prey. But also here I had not like one thing which has no relation to the “supreme spheres” and subtleties of the theory of evolution, but is studied at lessons of biology at school.  
**In film** it is shown, as the insect bumble beetle is involved by plant **for pollination** with the help of the flower simulating dead creature flish. The task of it is interpreted undoubtedly and unequivocally as we see in film the flower with petals similar to the body and fins of the winged monster. Also we see, how the bug departs from plant, stuck round **by its seeds.** And this role of insects in life of plant does not call to any in question too. The most unexpected animals can fulfill the role of pollinators and seed carriers. Main thing is “to play” skillfully at their pressing needs. But the fact, that between two events - an arrival of the bug to plant (for **pollination**) and its flying away (with **seeds** on the abdomen) - **some minutes** have passed only, has completely broken common sense. The plant can not hold the bug for a long time - the adult bug bumble beetle does not live more than one day. Any its delay by one plant will result to that the bug simply will not live before visiting the next plant. Had seeds really the time to ripen so quickly? Or they were already ready before flowering? Then all sense of pollination (carrying of sexual cells, increase of genetic variety of posterity) will reduce to zero. Hence, the conclusion by itself arises, that pollination had taken place and also seeds had time to ripen in those minutes while the bug feverishly searched for the exit from the trap. I can not make other conclusion, proceeding from had seen in film.  
Usually it occurs so: the plant begins to blossom > the pollination takes place > the flower fades > the fruit ripens > seeds are carried. It can be told by any schoolboy. But in film we see, that at the plant the flower is fresh and bright, but simultaneously in it seeds have already ripened. It is the paradox, isn’t it?  
**In the book** attempt to answer this question is made. But the answer is so original, that besides it derivates new questions. Imitation of dead body of flish, according to the book, appears not the flower, but spatha – flower-covering leaf of the plant. I believe, some plants of the present days have such trap leaves. Plants of genus Cryptocoryne, known to any in the slightest degree experienced fan of the aquarium-keeping, are those. They keep midges, its pollinators, in inflorescence, certainly, not before the ripening of seeds, but equally so that pistillate flowers will be pollinated and then anthers in masculine flowers will ripen. After the flowering of masculine flowers the hairs, keeping midges, fade, and had strewed by pollen insects depart... to the new flower. Similar by something events we see at the predatory plant of desert “deadly bottletrap”. Only the insect carries not pollen, but seeds. It is necessary to think: can relations between flower and insect will develop this way?  
In the book it is told, that the predatory plant is self-pollinated. And at the same time we see at it leaves perfectly simulating flish body. Self-pollination is not the best way of breeding: thus the plant transfers to descendants the limited set of genes. It results in pauperization of genotype of posterity and degeneration of species. Plants of many families have the mechanisms actively interfering self-pollination. It is different length of pestle and stamens, self-incompatibility of pollen, the difficult form the flowers in the beginning directing the pollinator to pestle of flower and only then strew pollinating animal by pollen. Some plants in general are gonochoristic ones, that is masculine and pistillate flowers develop on different plants. In other words, the self-pollination is not the best result. If there is an opportunity to avoid it, plants use this opportunity. At the “deadly bottletrap” such opportunity is present. Recollect the modified imitation leaf. Such adaptation could not be developed as the result of interaction of plant with factors of inorganic nature. The reason of occurrence of such adaptation was close connection of plant and insect, perhaps – their co-evolution, interspecific selection. Thus one species turns (certainly, not meaningly, and at times and harmfully to itself) to the factor of selection for other species. In modern Africa plants of genus Stapelia by the same way “deceive” flies. Insects crawl in flowers, involved with their smell and the color simulating carrion. They lay eggs in flowers of Stapelia, but their larvae perish: they do not eat vegetative tissues. But flies, visiting flowers, promoted the development by plant of colours and smell of flowers simulating carrion. Relations between “deadly bottletrap” and bumble beetle last too long - the refined subtlety of plant attraction testifies to it. Hence, relations of flower and insect last not one million years. And it is stranger so that “deadly bottletrap” in so favorable conditions had become self-pollinating plant.

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| **The tentacled forest** |

***Lichen tree - a branchy cranberry of the future.***

Once upon a time certain foreign traveler had published the book about his travel in the Russia. In this book it had been written, that once this traveler had a nice rest near large branchy… cranberry! After publishing of this book the “branchy cranberry” had become a symbol of book lie in Russia. Have you understand now the idea of the title?  
The aspiration to originality of thinking has once again played a bad joke with authors of project “The Future is Wild”. In forest of the far future they have lodged strange leafless lichen trees. If to estimate probability of occurrence of such vegetation even in the far future, chances of it will appear zero. The matter is that such trees basically could appear on the planet only in one case: when ALL WITHOUT EXCEPTION ground plants will disappear. Otherwise competitiveness of lichens in comparison with usual plants will be extremely low. The new species appear in nature only when there is a free ecological niche or when the species, occupying it, is less competitive, than “applicant” species. But can lichens be so competitive? It is known, what even grassy plants in favorable conditions easily turn to trees. Species Senecio and cactuses of different species at Galapagos islands are those, for example. Trees are present in many families of dicotyledonous plants and in some families of monocotyledonous ones. Among monocotyledonous plants more often existing as grasses; graminoids Poaceae, sedges Cyperaceae, orchids Orchidaceae, aroid plants Araceae), lilies and their relatives Liliaceae are those families rich in species, Trees appear among them not so seldom: they are present among families Agavaceae (Joshua tree), Pandanaceae (“screw palms” in tropics are large trees) and Arecaceae (everyone know, that the palm is tree or bush, but not grass). And among dicotyledonous trees are even among the families, more known to particular people by their grass representatives: among families Apiaceae, Papaveraceae, Solanaceae, Asteraceae, Fabaceae. Lichens have practically no any chances to grow up even to the size of any bush: at them is not present neither vessel system, nor mechanical tissues, therefore to become big for them is more difficultly, than to the frog from fable to puff up to the size of the bull.

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| During evolution it is always easier to transform already available organs and tissues to new conditions of habitat, rather than to form specially any new organ. |

Therefore, if in the nature the place favorable for growth of hypothetical “lichen tree” suddenly will appear, it will be occupied by higher plants much faster, than lichens will form necessary for life as a tree organs and tissues. Even at extinction of flowering plants the fern will grow up to the size of tree faster, than lichen to the size of fern. Conditions for competition are too unequal, and they are obvious not for the benefit of lichens.  
“Almost all flowering plants had become extinct, they had been replaced by lichens which had become capable to grow up vertically upwards till the size of bushes or low trees” - this statement of paleobotanist Bruce Tiffney has rather puzzled me. “Funeral” of flowering plants, I think, will come not so fast. Above I have already told, what is it necessary to make to lichens to begin trees and when it will happen. I think, that flowering plants are enough competitive just because they develop much faster than other groups of plants. Gymnosperm plants have slow fertilization. Mosses and ferns in the life cycle at some stages of development depend on presence of drops of liquid water. It makes present plants vulnerable and limits places of their inhabiting. And at the same time flowering plants have amazing evolutional flexibility. Some of them have time to pass life cycle from seed up to fructification during few days and weeks. Flowering plants have developed practically all suitable for plants places of inhabiting: from mountains up to coasts of ice Antarctica. They can be met both on saline soils, and in dry deserts, in fresh waters and even in the sea, where water instead of the wind carries their pollen. Ability to adaptation and fast rate of alternation of generations also have allowed flowering plants to become dominants in flora of the Earth. And among the same coniferous plants, for example, there is no grass or water plant. Treelike ferns have not developed life in temperate altitudes of Northern hemisphere with their cold long winters. And mosses do not live there, where cactus or saxaul prospers.  
Mass extinction does not occur in one day, as any Bible accident. It is the process which consequences are delayed to hundreds and thousand years. For this time one species die out or reduce area of an inhabiting and number, but others adapted to extreme conditions, rapidly develop. Representatives of any genera do not disappear instantly for one day, simply number of their species slowly and steadily varies. And species which generations replace quickly, have fine chance to adapt - carriers of the mutations becoming favorable in changed conditions, restore number of species and grasp became free places of inhabiting. Generations of lichens are replaced slowly - their colonies can exist hundreds and thousand years. Therefore lichens simply will not have time to grasp became free ecological niches, that is the main condition of new speciation. The ecological niche of lichens is those places of inhabiting, where any other species, except of them, can not live. These are stones, fumes, rocky taluses. Lichens represent the pioneer vegetation hardly enduring competition. They differ by the slowest growth, and in most cases when conditions become acceptable (for example, particles of ground collect), lichens are quickly replaced with mosses and flowering plants. And only there, where higher and sporous plants can not live for any reasons, lichens exist long time. Therefore in the future more successful “neighbors” will not allow growing up to lichen.   
Among “neighbors” of lichens there are not only plants, but also animals. And the destiny of them is not less paradoxical and dramatic.

***The megasquid - it is worse, than whale on land.***

Perhaps, to compete with flying fish flish in strangeness and unnaturalness only the awful huge megasquid can. This jumbo monster by whim (I think, it is impossible to tell other words) of authors had left water and had adapted to life on land, having turned to the multiton monster without any bone in the body. Can this animal live or it is possible to consider, that it was “stillborn”?  
It is known, that if the skeleton and muscles of an animal are insufficiently strong, serious problems can expect it. So, from cetaceans only small dolphins rather normally can endure some time stay on land (them even can be transported at times without water). And larger animals cast ashore, simply choke, pressed down by weight of their own body. Their muscles are relatively weaker than muscles of small cetaceans, therefore the large whale on land can not cope with body weight and dies, choking, and not being can make any breath. The megasquid is the same whale on land, only in much worse condition. The whale has even weak and impregnated with fat, but nevertheless skeleton, and at monstrous cephalopod, comparable by weight with killer whale or the bottlenosed whale, there is no support for internal organs. All its body is literally given for the tormenting to gravitation. Internal organs of an animal will press against each other whereas at vertebrates they are attached to bones and their weight is allocated through skeleton on the ground, instead of organs laying below.  
In the book one assumption which is not present in film is made: there it is told, that in legs of the megasquid nevertheless there is cartilage. I do not dispute that at cephalopods the gristle-like tissue can be formed: at modern cephalopod the brain is protected with original gristly capsule. However at the multiton megasquid presence of a cartilage in legs is practically useless: everyone knows, as far as the cartilage is fragile, when gnawed round bone from soup. At cephalopods cartilage is even more flexible, than at vertebrates: despite of gristly "skull", the octopus easily squeezes to very narrow cracks of reef.  
Certainly, there are in nature small ground animals absolutely without bones and skeleton. They are slugs and worms. But they live in the small world where distribution of forces is rather another. If you remember reasoning about the egg of toraton, you will understand about what I want to speak. At increase of the linear sizes the area of body and section of muscles (and their strength) increased in square proportion, and weight of body - according cubic one. Hence, relative force of muscles of giants lags behind their growth, and becomes much less, than at small ones. Therefore the megasquid is many times weaker than snail, and its muscles will be unable to keep its huge body. At small animal forces of elasticity of muscles support the form of body. It quite suffices for keeping of small weight but if the animal will increase its size, these forces will be insufficient for supporting of the shape. Muscles can not change qualitatively so strongly to make the megasquid a reality - for this purpose essentially other anatomy of body is necessary. Among modern animals of land skeleton-less forms are tiny and small. But ones having skeletons - arthropods and vertebrates – had become lords of a land. In the sea where pushing out force of water equalizes advantages of skeletal and skeleton-less creatures, we see huge jellyfishes weighting up to 100 kg, 18-meter (and according the unchecked data, larger) huge squids, 30-meter worms, 20-meter colonies of tunicates, and set of other giants which on land would turn to slime jelly.  
If to touch features of physiology of the megasquid, blood supply of its muscled legs seems practically impossible. The matter is that at the support on leg of multiton body pressure in it should strongly increase. Thus contraction of ring muscles most likely will squeeze out blood back in body. When the animal walks, muscles alternately contract and relax, pressure of blood during this process alternately increases or falls. In any measure it will promote blood circulation in vessels of legs. But if to the megasquid will occur to stop to enough long time, it is waited with oxygen starvation of leg muscles. It is difficult to tell, how its nerves will sustain constant differences of pressure of environmental tissues. Vertebrate animals with firm skeleton and invertebrates with shell (external skeleton) do not experience such difficulties because bones or shell take up significant part of weight of animal body, removing loading from soft tissues. The shell (exoskeleton) of arthropods has no blood vessels and has not cellular structure – it is the hardened secretions of covers of body of the animal. Exoskeleton has no problems with blood supply owing to absence of necessity for those. The bone of vertebrates is supplied with blood through blood vessels which penetrate it. They are protected from pressure differences in tissues by firm incompressible bone. At boneless megasquid muscles forming the leg, should be supplied by blood actively (necessity for blood at muscle is more, than at bone), but at the same time pressure jumps in them can interfere bloodstream. Certainly, heart of the animal can become very strong to push blood, overcoming internal pressure in the leg. But then at the animal the system of valves in vessels, which prevent the increase of pressure in organs and tissues of body, should be developed. Otherwise the animal can die from the insult and heart attack.  
Besides the liquid can not give to the body of the animal the sufficient support by virtue of its properties: liquids well keep volume, but do not keep the form. Because of it the body of the megasquid can not become so high as its inventors imagine: at the slightest roll of the animal liquids of its body simply will “flow” sideways, and the monster will fall down.  
If to think more generalized, it is necessary to tell, that during the geological history of squids there was an adaptation of this group of animals to pelagic life (that means, to inhabiting in the ocean in thickness of water), accompanied with reduction of internal skeleton. Already at modern squids the skeleton is presented only by transparent horn plate named “gladius”, located in the top part of body. Therefore it is possible to assume, that some tens millions years later squids will completely lose skeleton, that for ever will close to them the way to land, at least as to high and large animal. Any crab or spider will have giant advantage in comparison with the languid and indistinct squid, solved to lodge at the land, in speed and mobility. While on land there will be organisms with skeleton (arthropods and vertebrates), the entrance to the land will be closed to squids. And worms and small gastropods simply will not “allow” them to play the role of small creatures. Thus, ecological niches of land will be closed for cephalopods. And I already spoke about features of their physiology, discussing the reality of the swampus.

***Squibbon: the clumsy acrobat.***

It would be rather silly to believe, that the forest is inhabited only by elephant-shaped megasquids working “in combination” as herbivores and predators. At them there are certain neighbours. One of them is the relative of the megasquid, the squibbon. Its habit of life also has "pep".  
Strange feature of clambering at squibbon is its habit of movement. In the book it is impossible to notice it because of clear reasons, but in the appropriate series of film it is possible to enjoy the remarkable dexterity of this forest cephalopod, and at the same time to think about its especial habit of movement. And what feature is so strange here? The animal moves on branches, by turns seizing them by pairs of tentacles, similarly to the acrobat under the dome of circus. Moving of the squibbon is similar to brachiation (“walking on hands”) of the monkey revolved aside: the body turns around of horizontal axis, instead of vertical one. The habit of branch seizure of this impossible animal surprises here: the branch seize takes place not from above, and from below. But the squibbon skips from one branch to another. Thus the centrifugal force arising at rocking of an animal, will “untwist” the capture of the animal, making because of it less strong. And it is fraught with casual falling... Among modern gibbons, according to research of skeletons in museums, up to 1/3 animals receives at life fractures after falling from branches. Certainly, fracture does not threaten to the boneless squid, and the strongest bruises and breaks of the internal organs not protected by thorax and serious concussion of the brain, covered at the best in gristly capsule, are guaranteed. At the “above” seize of branch the effort of animal shaking on it, on the contrary, will press more densely its extremity to the branch and to promote stronger seize. To understand more popularly, I advise simply to shake on the horizontal bar, having seized it alternately by different ways and to compare sensations after it. Clearly, that the habit of movement of forest cephalopod shown in film is rather fantastic if, certainly, to not consider unreality of the origin of this animal.

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| **Fauna of the new Earth, or “Oh, the marvelous new world!”** |

Authors of the project “The Future is Wild” have populated the Earth by set of really strange, and sometimes completely unreal creatures. According their representations, the fauna of the Earth of the future will differ strikingly from modern fauna.   
Certainly, it is not reasonable to wait the similarity between representatives of fauna of the future and animals of the present day, but the difference between them at the level of phylums and, probably, classes, will be, in my opinion, not so great. My argument for this judgment is the history of the past of the Earth (that one, to which professors had referred, proving the reality of surprising heroes of film and the book). The time interval between imagined fauna of the future and real fauna of the present day is 200 million years. For the history of the Earth it is equal to the time interval between Triassic and the present time.  
If we shall analyze the structure of fauna and its change, we shall see that **at the level of phylums** dominant groups of animals standing at tops of food pyramids **have not changed.** On land they are vertebrates and arthropods, and in water - cephalopods and vertebrates: fishes of different groups. And even for larger time interval they had not replace. Only dominant classes had replaced:

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| The geological period  Group of animals | Late Paleozoic | Mesozoic | Cenozoic |
| Sea | | | |
| Cephalopods | Nautiloidea | Ammonoidea and Belemnoidea | Shell-less cephalopods (octopuses, squids, cuttlerfishes) |
| Vertebrates | Cartilaginous fishes (sharks, rays and others) | Ganoid fishes (relatives of sturgeon, and shell pike) | Osseous fishes (the majority of modern fishes) |
| Land | | | |
| Arthropods | Insects and arachnids | Insects and arachnids | Insects and arachnids |
| Vertebrates | Amphibians and theromorph reptiles (ancestors of mammals) | Reptiles (archosaurs, including dinosaurs and pterosaurs) | Birds and mammals |

Certainly, some of groups of live organisms dominated in the past have lived up to present epoch, and modern lords of the planet had appeared in earlier times. The table only shows, when they have occupied prevailing position in fauna.  
Borders between the geological periods are marked by mass extinctions - asteroids and other extraterrestrial “visitors” had “successfully” fallen on the Earth and in the Cretaceous period the increase of volcanic activity has also supplemented to this. And the table did not include the meeting of the Earth with any comet, whose parts, having fallen to the Earth, had marked the border between Triassic and Jurassic periods of Mesozoic. Thus, it is possible to see, that despite of these cataclysms, structure of fauna at the level of large taxons (phylums and classes) had remained practically constant. Besides, some representatives of dominating before groups of animals have lived up to now, having gone through epochs of mass extinctions. And among the accidents had shook the Earth, the late Cretaceous one, accompanied with extinction of dinosaurs, was not the most terrible. As scientists suppose, at that time up to 50 - 60 % of the species inhabited the Earth had died out. But extinction of the end of the Permian period, finished the Paleozoic era, had carried away in non-existence up to 90 % of species! And nevertheless many classes of animals had gone through it.  
But in the project “The Future is Wild” the idea is formulated, that in the far future (after 200 million years) the structure of ground fauna will be replaced practically at 100 %. And to the role of forms dominating in overland fauna animals having now no (and, according to the rule of progressing specialization, will hardly have in the future) adaptations for development of completely new inhabitancy (that already is contrary to a principle pre-adaptation) are advanced. They are cephalopods and osseous fishes. Ground tetrapod vertebrates are “buried” by authors during the mass extinction of 100 million years in the future. But the fact that tetrapod vertebrates had gone through extinction in Permian, Triassic and Cretaceous periods, indicates that they will not hand over their positions so easy. Besides authors recognize, that insects will survive after the mass extinction. And if there will be insects - there will be no flying fishes. If there will be arthropods on land - the squid will not go out from the sea.  
When arthropods had colonized land, they were out of competition - on land yet there were no animals. When crossopterygian fishes in Devonian had left water, they too were out of competition – there was no animals larger than them (centipedes, certainly, were longer, but more thin). That, all of them had time to adaptation. Later insects have became the most numerous, and vertebrates - the largest inhabitants of land. And they have occupied the majority of possible habitats, having left to other groups of animals wretched leavings of past opportunities. Both groups of animals easily adapt and are enough flexible in the evolutionary relation. Therefore they simply will not give time to new groups of animals to come from the sea and to adapt to life on land, having left them at the level of “amateurs”.  
Therefore I think, that radical change of structure of Earth fauna (at the phylum level) absolutely will not be, though at the level of classes and furthermore - orders and families, as people say, “variants” are possible.

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| **Epilogue** |

After so destructive and caustic digression to far and very wild future the time to look back and to look, what have we achieved, has appeared. It was found, that only two series of film and two chapters of the book from 12 ones appeared not mentioned by ruthless and shattering criticism. These are stories about inhabitants of salt desert of the Mediterranean (5 million years in the future) and about terabites and worms of desert (200 million years in the future). The author of present lines supposes these series as most natural and consistent (at least it was not possible to find serious and essential contradictions with laws of evolution).  
The conclusion from all told is rather simple and clear: the movie, certainly, is beautiful, and in the book there is plenty of color pictures. However scientific “basement” of this project appeared rather unsteady, despite of numerous doctors of sciences and the professors, trying to prove the opposite point of view. I think, the book and animation film “The Future is Wild” are interesting for looking and studying, but their contents, to our great regret, is not free of lacks, about which I had told so, how I had managed to do it.

Paul I. Volkov   
Vladimir, 2003 - 2004.