# Can evolution produce new organs or structures?

**Jerry Bergman**

**Organs theorized to be developing but not yet useful (but which are hypothesized to become useful in later evolutionary development) are called 'nascent organs'. Nascent organs must exist if Darwinian evolution is true, but Darwin expected them to be rare at any one time in history because they would supposedly soon be supplanted by more perfectly functional organs. A literature review shows that all extant human and animal organs are fully operative in healthy individuals. For this reason, almost all evolutionists have dropped the idea of nascent organs, and, instead, believe that all functional organs evolved from previously existing functional ones. However, functional organs require a minimum level of irreducible complexity, and therefore the need to originate as nascent organs. This is a problem for Darwinian evolution, since nascent organs do not appear to exist.**

Evolution is based on the idea that *all* organs developed from simpler ones; thus, once the original organ evolved, new and improved organs subsequently evolved from it. For an organ or structure to be selected by natural selection, it must first exist. The challenge Darwinists face is to find evidence of *new* organs evolving—such as a primitive proto-lung or heart. 'Simpler' hearts exist, but all are functional and designed to allow the specific organism to survive in its environment.[1] A particular organ may be larger or more complex in one animal than in another, but that does not necessarily mean it is 'more evolved'. The letter 'T', for example, is more complex than an 'I', but it is not better, only different; both letters are 'perfect' for the task for which they were designed (effective communication).

Organs theorized to be developing, but not yet useful (yet which are hypothesized to be useful in later evolutionary development) are called *nascent organs*. Darwin[2] expected to find few nascent organs at any one time in the living world, arguing that they would soon be supplanted by their more perfect successors. He also expected them to be comparatively rare at any one time in history because they would be replaced by more functional organs that would persist for a long time if they conferred a clear survival advantage to the organism. Nevertheless, according to his theory, Darwin[2] expected to find in the living world at least some organs in a 'nascent condition, and progressing toward further development'. He also gave us some idea of what to look for, but noted that it often would be 'difficult to distinguish between rudimentary (i.e. atrophied through disuse) and nascent organs'.

Nascent organs (and nascent carbohydrate, protein and lipid structures as well) not only were predicted by Darwinism, but many *must* have existed historically if evolutionism occurred—a logical expectation of evolution, since all organs and structures would have been at one time nascent. However, after a century and half of looking, researchers have not found evidence of a *single* nascent organ developing in any plant or animal because all known organs are currently functional. A 2005 search of the over 18 million journal articles in two scientific literature databases using the term 'nascent organ' revealed that *not a single example* of a nascent organ has been demonstrated or even postulated. Only five studies were located, all of which related to the normal development of embryos.[3–7] This literature review, and the study of life in general, indicates that all extant human and animal organs are functional and fully developed in healthy animals. For this reason, almost all evolutionists have dropped the idea of nascent organs and, instead, believe that all functional organs evolved from previously existing functional organs, not nascent organs. A problem with this conclusion is explaining the source of completely new types of organs such as the liver or the special senses.

## Exaptation

A postulated mechanism for producing new organs or structures is 'exaptation', the process of an organ or structure evolving to perform a *different* function from its original use.[8,9] Exaptation refers to a structure that evolved into a new structure that serves a different purpose than it originally was evolved for in the animal. An excellent example is the jaw bones, which are theorized to have evolved to function as sound transmission structures in the ear.[10] Shanks concluded that exaptation is the primary way in which organisms acquire new genes and, eventually, entirely new organs: 'They do not appear by magic; they appear as the result of duplication.'[11] Another related theory is that the evolution of structures and organs is the result of *gene duplication*. The duplicated gene would then be able to evolve, allowing the gene copy to continue to carry out its normal functions. Both gene duplication and exaptation are topics of another paper that I am now completing, and will not be covered here except to note that a major problem with all of these explanations is that if all organs were at one time nascent organs, their beginning still must be explained. This has proven difficult for Darwinists

***'... their beginning must still be explained.'***

to do, and for this reason Darwinism has concentrated on the evolutionary development of existing organs.

Another problem with this conclusion is the fact of irreducible complexity: a certain level of complexity is required for an organ to function. Organs can become simplified only so far before they can no longer function. The simpler organs that complex organs were hypothesized to have evolved from require a minimum level of complexity, and even the simplest structures in many forms of life are still extremely complex. An example is ATP synthase; even in bacteria it is enormously complex and no proto ATP synthase is known. *Even if a proto ATP synthase was discovered, the problem remains: where did the proto synthase come from?*

## Organ development

The existence of a more advanced organ does not necessarily provide evidence of evolutionary descent. For example, smell is much more developed (and much more sensitive) in dogs than in humans, but this does not support the conclusion that dogs evolved from humans. Likewise, sight is more developed in birds, but this does not indicate that birds evolved from humans either. Nor would humans be better off with a sense of smell comparable to that of a dog or with sight like a bird. We likely would end up with sensory overload, and be far *less* able to function (as is common in some work environments that cause sensory overload).

Darwin acknowledged the difficulty in distinguishing between organs in the process of development (nascent) and those in the process of degeneration (rudimentary):

> '… in some cases the distinction is not easy. The [rudimentary organs] are either absolutely useless, such as the mammae of male quadrupeds, or the incisor teeth of ruminants which never cut through the gums; or they are of such slight service to their present possessors, that we cannot suppose that they were developed under the conditions which now exist. Organs in this latter state are not strictly rudimentary, but they are tending in this direction. … Nascent organs ... though not fully developed, are of high service to their possessors, and are capable of further development.'[12]

This description completely confuses the issue because, according to Darwinism, *all* organs are capable of further development (thus, accordingly to this definition, *all* organs are nascent). This definition results in the concept losing any useful meaning. At the least, only clearly undeveloped proto-organs fit the concept. This confusion may have arisen because confirmed nascent organs have never been found.

Nobel Prize winner Albert Szent-Gyorgyi tried to confront the problem of new organs, one that he considered a primary difficulty of evolution. He saw the major problem was the fact that a body organ is useless (or worse) until it is functional, and that it generally must be completely (or largely) developed for it to confer a positive selection advantage. Szent-Gyorgyi concluded that only after millions (or at least thousands) of the needed mutations—all working together as a set—have produced a superior working organ could it confer an advantage to the organism possessing it. And these useless mutations would somehow have to be passed on for thousands of generations until the *proper set formed an integrated functioning unit* that resulted in an organ that was functional in concert with all other existing body organs. This difficulty is illustrated by Szent-Gyorgyi as follows:

> '... Herring gulls have a red patch on their beaks. This red patch has an important meaning, for the gull feeds its babies by going out fishing and swallowing the fish it has caught. Then, on coming home, the hungry baby gull knocks at the red spot. This elicits a reflex of regurgitation ... , and the baby takes the fish from her gullet. All this may sound very simple, but it involves a whole series of ... complicated chain reactions with a horribly complex ... underlying nervous mechanism. How could such a system develop? The red spot would make no sense without the complex nervous mechanism of the knocking baby and that of the regurgitating mother. All this had to be developed simultaneously, which, as a random mutation, has the probability of zero. I am unable to approach this problem without supposing an innate "drive" in living matter to perfect itself.'[13]

Although all animal organs and structures differ greatly in size, structure and function, in my literature search I was unable to find a single example of a non-functional organ. Every organ and structure researched so far has been found to be designed for the animal's own specific needs. No evidence exists that even one of the vast number of existing organs and structures in living animals is half-developed or in the process of developing a new function.

## Male and female sex organs

As an example, how could the male and female sex organs (and the anatomy and physiology of their sexual behaviours) become perfect functional complements of each other if they had developed independently and gradually in a long process of 'parallel evolution' as hypothesized by Darwinists? The important point is they would not become functional until long after they were required. Until then no reproduction could occur, and the proposed process of development would be stopped before it started. Anything less than a

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complete functional system would result in a sterile animal, dooming that species to extinction.

Even Darwin admitted that 'any variation *in the least degree injurious* would be rigidly destroyed' or, in other words, would cause the extinction of the animals with the 'less than functionally developed' organ. The difficulty of having offspring until the reproductive system was perfected is a universal problem for evolution. The chasms that divide sexual and asexual reproduction, and their various forms such as egg and live birth, are bridged by no viable 'transitional' form candidates.[14] In many cases, it is difficult to even mentally create possible intermediate workable forms. Darwin noted that:

> 'Natural selection acts *only* by the preservation and accumulation of *small inherited modifications* ... if it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.'[15]

## Eyes

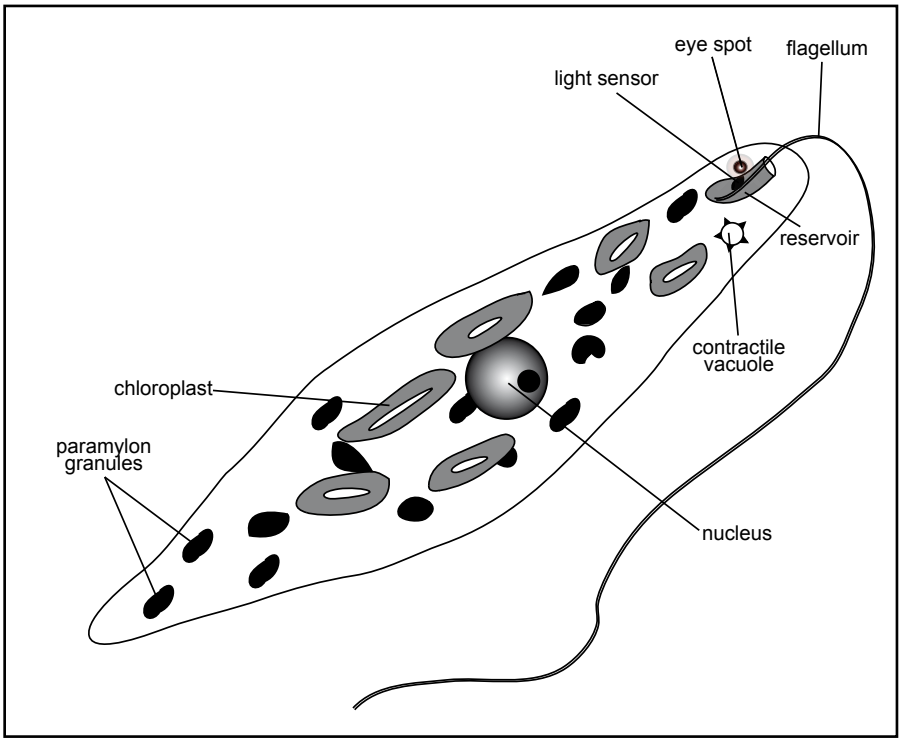
Although Darwin cited some alleged examples of intermediate organs, research has proven that all of his examples (as well as all those proposed since) are fallacious.[16] For example, Darwin evaluated all types of eyes, and lined them up from what he thought was the simplest (an eye spot) to the most complex (the human eye), and then postulated that the complex eye could have evolved from the simple eye (or one like it). One of the many problems with this conclusion is that these are different types of eyes *designed for entirely different purposes and environments*.

An animal such as the euglena, which has an eye spot, for example, would not be able to use a structure even close to a human eye. The eye of the euglena is a complex specialized organ and is not merely a simpler version of the human eye. *Only* the so-called 'eye spot' eye serves the euglena's requirements to allow it to live in the environment in which it must exist. A more complex eye would require a more complex nervous system (among other adaptations), resulting in a larger animal, which would require yet further modifications. The result is we would end up with another animal that would likely be less well adapted than the highly successful euglena. No reason exists for the euglena eye spot to produce the image quality required for human needs, nor even the type of image an octopus eye requires to thrive in its environment.

Sight organs vary greatly—many clearly different types of eyes exist—yet each one is fully functional and highly integrated with its scores of necessary complex support structures.[17] No 'intermediate' eyes have been discovered, but only fully distinct and different types of eyes, each one fully functional. Even the simplest eye is still enormously complex—which perfectly illustrates the principle of irreducible complexity.

## The design challenge

All human mechanical inventions require intelligent design and the building of prototypes. Next, testing of the prototype must occur, and feedback from these tests is used to improve the original design. Eventually, sometimes after years of testing, the product may be able to be marketed. The most difficult test of all is the consumer vote. Most products are continually evaluated by the feedback obtained from market testing; then they are often redesigned and tested again. Living organisms do not have this luxury; all their millions of parts must work correctly the first time, both separately and as a complete and functional unit, or the animal will die before it is able to reproduce itself. For the animal to survive during each and every stage of its evolution, each animal must have many *thousands* of different complex parts, all of which must work together and function as a unified whole.




*The eye spot of the single-celled eukaryote euglena, although not as complex as the human eye, is nevertheless a complex, specialized organ which is perfectly designed for its environment.*

## Can transitional organs survive?

A major impediment to the acceptance of Darwinism from its inception has been not only demonstrating, but actually explaining, how body organs could evolve. A computer search of three databases (including *Biological Abstracts*) containing over 20 million records, found not a single documented example of a clear evolutionary transitional organ. It is difficult even to mentally reconstruct an evolutionary path of complex (or even simple) body organs. This lack has motivated the development of new non-Darwinian theories of evolution.[18] Evolutionists not only have no evidence of transitional organs, but also lack plausible armchair examples. Part of the problem is explaining how a working eye, ear or kidney could evolve from cells to a complex interdependent organ by the accumulation of slight modifications of simple 'primitive' organs or structures, or even 'jumps', in the saltational 'hopeful monster' style of punctuated equilibrium.

This is no minor concern in evolutionary biology. Darwinists have been able to use composite (or mosaic) creatures, such as *Archaeopteryx* or the duck-billed platypus, as evidence of transitional organisms. (If *only* fossil evidence had been found for the platypus, it might be passed off as a plausible transition, but because it is still living, we can demonstrate from the whole organism that it does not serve this purpose well.) What must be located by Darwinists are actual transitional organs, because it is too easy to produce misleading results when all one has as evidence are bone fragments. Even if a complete skeleton is available—a rare situation—the bones usually consist of less than five percent of the total animal.

An organ that is *useless* often interferes with life (using up information, energy and space) until it functions properly, and for this reason it is thus likely to be selected against. Lack of use may also invite disease and atrophy of the organ for the reason that the less active organs will normally receive a lower level of food and oxygen than the functional organs. Although some animals and organs provide better examples than others, this same problem exists for *every* organ and structure of *every* type of plant and animal. To summarize, as Gould admits: 'The argument still rages, and organs of extreme perfection rank high in the arsenal of modern creationists.'[19]

## The example of spider webs

In the posterior section of a web-building spider is located a highly specialized complex organ that is used to spin (actually manufacture) spider webs existing in many varieties. Without the total set of parts, all harmoniously functioning as a unit in a working web-spinning organ that is properly integrated with all of the dozens of its required accessory structures (such as the nervous system components and the program to run the required behavioural responses), most kinds of spiders would not be able to secure their food. How they survived for millions of years, as is claimed, while their web-spinning organs and accessory structures were evolving to the point that they were functional, is an example of this major unsolved problem of Darwinism. Since spiders obviously must have possessed effective food-procuring techniques during the long period of time their web mechanism was evolving, we are forced to ask: what caused the development of these complex spinning organs that were useless, or worse, until they became at least partly functional?

Once their web system is effective, what in the environment could have selected it over the spider's older methods of procuring food? Since webs are far less effective than many hunting techniques, the system it displaced—or replaced—must have been even *less* effective, making one wonder how it survived. The web system also was worse than useless until a large population of flying insects existed. This complex system of catching nutrients actually would be a hindrance *until* it was perfected to the extent that it was highly effective (or at least was effective) because

*To spin a web, spiders not only require all of the parts of the web-spinning organ functioning as a unit, but also their integration with dozens of accessory structures such as the nervous system components and the programmed behavioural responses. (Image from Wikipedia, the free encyclopedia.)*

of its interference with the animal's health and space/time efficiency.

## The bombardier beetle

One of the better-known examples of the organ-development problem is the bombardier beetle's 'gun'. Beetles are known for both their variety and their creative and ingenious ways of coping with survival problems. Bombardier beetles are commonly found near ponds, under rocks and decaying trees, and among the criteria used to identify them is their bright orange and blue colouration.

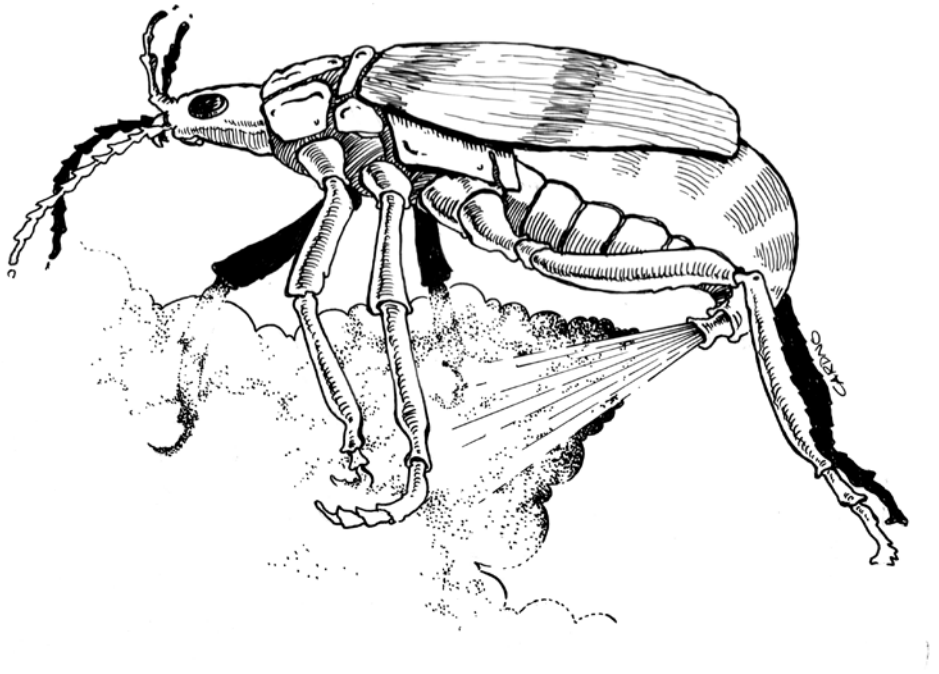
The ejection for some bombardier types such as the *Metrius contractus* is a single continuous flow,[20] while that of the *Brachinini*[21] and *Stenaptinus insighnis* is not continuous, but rather quick machine-gun-like pulses (about 500 pulses per second), basically similar to the World War II German V-1 buzz bomb propulsion mechanism.[22]

To achieve this spray, bombardier beetles possess specialized glands that, depending on the species, secrete a mixture of various types of hydroquinones, n-pentadecane, and hydrogen peroxide into the chambers or sacs (called pygidial defense bladders) that lie at each side of their abdomens.[23] Smaller outer chambers called chitinous chambers located on each gland contain a mixture of enzymes, including catalysts and peroxidases, which catalyze the reaction when the mixture in the inner chamber is squeezed into the outer one. The oxygen gas produces rapid pressure increases that provide the propellant (quinine and water) for the benzoquinones. This intense chemical reaction also provides the heat.[24]

The entire structure involving hundreds of parts required to produce, aim and fire its poisonous mixture of unstable chemicals would be totally useless until the entire structure was complete and perfected. The inner compartments that contain the two potentially explosive chemicals must be designed in such a way so that they are fully isolated from the outer chambers that contain the enzymes which initiate the reaction, both at the correct time and in the proper amounts. It is crucial that the pressure build-up is properly timed, controlled and directed. Otherwise, the bombardier beetle could have blown itself into extinction or boiled itself alive! Critics have argued that the chemicals are not actually explosive,[25] but they do produce much heat and pressure in a chamber that could explode if not controlled and properly regulated.

The ability to mix very specific chemicals at the right time, and the complexity of the organs that produce the enzymes and reaction chemicals, as well as the storage compartments, reaction chambers, mixing muscles, expulsion nozzles, diaphragms, fluid interface valves, a fluidic logic control system and the scores of support structures, all argue against the view that slow changes in the beetle's anatomy due to a series of mutations produced this system. Many different species of bombardier beetle exist,[26,27] all of which are fully functional, and none of which can be used to support a Darwinian scenario. Aside from skunks (which eject a strong-smelling substance at will), no other animal has a structure even remotely similar to the bombardier beetle. If the structure had evolved through small modifications, surely many other animals would exist that likewise have evolved similar, but less (or more) complex structures. Yet, this is not the case: the bombardier beetle, although it is only one of millions of 'unique' animals, is completely unique in this one way.

***'... surely many other animals would exist that likewise have evolved similar, but less (or more) complex structures.'***



*The bombardier beetle's 'gun' is entirely useless unless it is complete and fully functional as a unit. It shows how difficult gradual evolution of this mechanism would be, since most of its components would not individually confer any survival advantage on the animal.*

Although some persons have unsuccessfully tried to claim otherwise,[25] the whole system is entirely useless until fully developed and fully functional as a unit. Most of its various parts would not individually confer any survival advantage on the animal. Isaak[28] outlined a set of 15 steps that could explain its step-wise evolution, but admitted that his list was pure speculation that lacks any direct evidence. These 15 steps are:

1. Quinones are produced by epidermal cells for tanning cuticles, as commonly exists in arthropods.
2. Some of the quinones are not used, but remain on the epidermis, making the arthropod distasteful. (Quinones are used as defensive secretions in a variety of modern arthropods, from beetles to millipedes.)
3. Small invaginations develop in the epidermis between sclerites (plates of cuticle), and by wiggling, the insect can squeeze more quinones onto its surface when needed.
4. The invaginations deepen, and muscles are moved around slightly, allowing them to help expel the quinones.
5. A couple of invaginations become so deep that the others become less important. Those gradually revert back to the original epidermis.
6. In various insects, different defensive chemicals besides quinones appear that help the insect defend against predators that have evolved resistance to quinones. One of the new defensive chemicals is hydroquinone.
7. Cells that secrete the hydroquinones develop in multiple layers over part of the reservoir, allowing the production of more hydroquinones. Channels between cells allow hydroquinones from all layers to reach the reservoir.
8. The channels become a duct, specialized for transporting the chemicals. The secretory cells withdraw from the reservoir surface, ultimately becoming a separate organ. At this stage, secretory glands connected by ducts to reservoirs evolve.
9. Muscles adapt that close off the reservoir, preventing the chemicals from leaking out when not needed.
10. Hydrogen peroxide, a common by-product of cellular metabolism, mixes with the hydroquinones. As the two react slowly, a mixture of quinones and hydroquinones can be used for defense.
11. Cells secreting a small amount of catalases and peroxidases appear along the output passage of the reservoir, outside of the valve that closes it off from the outside. These ensure that more quinones appear in the defensive secretions.
12. More catalases and peroxidases are produced, so the discharge is warmer and is expelled faster by the oxygen generated by the reaction.
13. The walls of that part of the output passage evolve to allow them to better withstand the heat and pressure generated by the reaction.
14. Still more catalases and peroxidases are produced, and the walls toughen even more and shape into a reaction chamber. Gradually, they become the mechanism of today's bombardier beetles.
15. The tip of the beetle's abdomen becomes somewhat elongated and more flexible, allowing the beetle to aim its discharge in various directions to accurately strike its prey.

This simplified list only serves to illustrate how difficult gradual evolution of this mechanism is and the problems with gradualism. As is obvious, many of these steps would put the animal at a selective disadvantage.

## The firefly

Another well-known example of this problem is the lightning bug or firefly (the females are called glowworms). It uses luciferase to produce a reaction in an organ appropriately known as the lantern.[29] Although more than sixty unique kinds of fireflies are now extant (all are beetles and each one is different), 'semi' lightning bugs in the process of developing a lightning system have never been discovered anywhere.[30] The bug either has the entire complex lighting system, or it does not have any part of it.[31]

Its lighting system is also highly effective and efficient. A human-made incandescent light bulb is only about ten percent efficient (meaning it produces ten percent light and ninety percent heat), but, in contrast, the firefly's light system is over *ninety percent efficient*, producing ninety percent light and only ten percent wasted heat.[32] Although all fireflies have an elaborate mechanism designed to produce light, the design varies considerably according to the type of firefly. The signals also vary in light colour, timing, temperature and light-flashing pattern.[29,31]

The only function that we have been able to determine for the light is mate attraction. Unfortunately, the light also is very effective in attracting predators (of which the bugs are fortunately blessed with only a few). Neither bats nor night birds usually consume them. A major predator is the spider.[33] If fireflies are caught in a spider web, though, the spiders will often free them. One of their few enemies is the tropical frog, which devours them in such quantities that its stomach can glow! An interesting phenomenon is the synchrony behaviour—fireflies will trigger a 'firefly flash burst' involving thousands of fireflies simultaneously flashing on and off every second or so.[34] The purpose of this complex behaviour has so far proven elusive, although some postulate that the reason involves collective mating behaviour.

## Conclusions

A literature search has determined that no claimed examples of nascent organs or intermediate organs exist today. Consequently, it is widely recognized that Darwin's theory of nascent organs has been disproved and replaced by a theory that postulates that all organs evolved from

other simpler organs. This theory is also problematic in that organs must be of a certain complexity before they can function, a concept called 'irreducible complexity'. Nascent organs are therefore still required in Darwinian theory but they do not appear to exist.

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