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The Deceptive Flowers of Orchids and Evolution by Natural Selection

Or How More than Eight Thousand Beautiful Facts are Slaying an Ugly Hypothesis[1]: Darwinism[2]

Part II

"The progress of evolution walks over **billions of corpses**."[3]

Ludwig Plate

"I believe natural selection represents **a truly hideous sum total of misery**."
"We understand that we are here as a result of **a truly hideous process**.
Natural Selection is **an ugly process** that has beautiful consequences."

Richard Dawkins

"The evolutionary process is rife with **happenstance, contingency, incredible waste, death, pain and horror**."

David Hull

"Namely, **selection** is the blindest, and **most cruel way of evolving new species**, and more and more complex and refined organisms … The struggle for life and elimination of the weakest is **a horrible process**, against which our whole modern ethics revolts…"

Jacques Monod

The whole of organic nature on our planet exists only by **a relentless war of all against all**.

Ernst Haeckel

According to Darwinism, the origin of species is the result of
"**primeval stupidity and original brutality**" ("**Urdummheit und Urbrutalität**"
for random mutations and the elimination of the weakest by natural selection).

Anton Neuhäusler[4]

Instincts are the "consequences of one general law leading to the advancement of all organic beings, -
namely, multiply, vary, **let the strongest live and the weakest die**."
However, "If it could be proved that **any part of the structure of any one species had been formed for the exclusive good of another species, it would annihilate my theory**, for such could not have been produced through natural selection."
"Natural selection will never produce in a being anything injurious to itself, for natural selection acts solely by and for the good of each."

Charles Darwin

A famous Darwin enthusiast ("evolution is not a theory; it is a fact") on the pollination of orchids:
"It's **hard to imagine how evolution has produced such a complex combination mechanism**."[5]

Sir David Attenborough

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[1]Reformulating Huxley's "[T]he great tragedy of Science – the slaying of a beautiful hypothesis by an ugly fact." See: http://www.weloennig.de/PlantGalls.pdf

[2] "Darwinism" is (again) an abbreviation used here (and by many further authors) synonymously with "neo-Darwinism", or "The Modern Synthesis" and the "Synthetic Theory of Evolution" with its main focus on "omnipotent" natural selection. For some reasons regarding terms, see please http://www.weloennig.de/BegriffNeodarwinismus.html

[3]Original German sentence: "Der Fortschritt der Evolution geht über Milliarden von Leichen."

[4]https://de.wikipedia.org/wiki/Anton_Neuhäusler

[5]Context: The bee coming from the male flower "no doubt somewhat dazed, flies away and maybe thinks it's not going to do that again, but is nonetheless attracted to another rather different looking flower, which is the female but which produces just that sort of scent and it sticks its head into the female flower and this little bundle of pollen ***like a key fits into a little aperture like a lock*** and it pulls off the pollen and leaves on the bees back a little bundle and lo and behold pollination has been achieve**.** It's hard to imagine how evolution has produced such a complex combination mechanism." As to his example of the comet orchid, see, please, below.

Main Points for Part II

Part I (*cf.* http://www.weloennig.de/BeautifulFactsPartI.pdf) closed as follows:

> "PartII is going to discuss especially the question raised by Douglas J. Futuyma: "We may wonder how an advocate of "intelligent design," i.e. creationism, might explain pseudocopulatory pollination." At present I'm working on this topic. Nevertheless, some hints have already been given by the citations of Karl von Goebel, Wilhelm Troll, Wolfgang Kuhn, and Robert Nachtwey above. But there are more points which have to be examined."

The first question, which may be raised for the validity of theory of intelligent design, could, perhaps, be concerned with functionality. Interestingly the following facts, which have been recently detected by a group of researchers, appear to be relevant to partially answer that question:

Małgorzata Stpiczyńska et al. (2018) detected in *Epidendrum* "the presence of secretory activity in species generally regarded to be rewardless":

> "Our study indicates that ***all investigated species produce nectar or nectar-like secretion to varying degrees***, and no alternative pollinator food-rewards were observed. Even though macroscopic investigation of presumed rewardless species failed to reveal the presence of secretion within the cuniculus, ***close observations of the cells lining the cuniculus by LM, SEM and TEM revealed the presence of cuticular blisters and surface material***. Moreover, the similarity of both the thick tangential cell walls (with the exception of *E. vesicatum*) and organelle complement of cuniculus epidermal cells in both copiously nectariferous species and those producing only small quantities of surface secretion **confirmed the presence of secretory activity in species generally regarded to be rewardless**."
>
> […] Orchids offer their pollinators a variety of floral food-rewards, such as nectar, oil and edible trichomes, with many more producing non-food rewards, such as fragrances, waxes and resins. Based on analyses by Neiland and Wilcock (1998), **the presence of nectar** in both temperate and tropical orchids **can increase their reproductive success** (fruit set).
>
> […] It should be emphasized that reward-producing and rewardless *Epidendrum* species have so far mainly been distinguished by macroscopic observation for the presence or absence of nectar within the inner spur [References]. Detailed structural studies of the cuniculus are scarce, particularly in species where nectar appears to be absent. This is the ***first time for such a detailed investigation*** of cuniculus structure to be undertaken for *Epidendrum.*"[6]

Also, Xu-Li Fan et al. (2012, p. 957)[7] – and many authors during the last more than 100 years in accord with them – mention that rewardless species appear to be less frequently visited by their pollinators than the rewarding ones:

> "Under these environmental conditions [wet season], as our observations indicate, **visits by pollinators are very infrequent**, a problem that is no doubt exacerbated by the fact that **the species** [*Acampe rigida*] **is rewardless**." [8]

Emerson R. Pansarin et al. (2012, pp. 850, 859)[9] on the origin of deceptive systems:

> "Shifts between rewarding and deceptive pollination systems have occurred many times in the evolution of the Orchidaceae (Dressler, 1981). ***Deceptive systems seem to have been derived from rewarding systems in the family*** (Ackerman, 1986).

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[6] Małgorzata Stpiczyńska, Magdalena Kamińska, Kevin L. Davies and Emerson R. Pansarin (2018): Nectar-Secreting and Nectarless Epidendrum: Structure of the Inner Floral Spur. See entire article at https://www.frontiersin.org/articles/10.3389/fpls.2018.00840/abstract

[7] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3448421/

[8] *Cf.* also http://www.weloennig.de/BeautifulFactsPartI.pdf, pp. 12, 14/15, 24, 36/37

[9] https://www.sciencedirect.com/science/article/pii/S0367253012001442

> […] It has been suggested that in Orchidaceae deceptive mechanisms evolved from pollination systems that offered rewards (Dafni, 1984, Ackerman, 1986, Nilsson, 1992). This view has been substantiated in many isolated cases (e.g., Ackerman, 1986, Johnson and Nilsson, 1999, Johnson, 2000), but rarely by studies under phylogenetic aspects (Cozzolino et al., 2001). According to Dressler (1981), shifts from rewarding to deceptive pollination systems may have occurred **many times** along the evolution of Orchidaceae."

Thus, if the findings of the former article on *Nectar-Secreting and Nectarless Epidendrum: Structure of the Inner Floral Spur* and the insights of the papers cited by Pansarin et al. could be generalized (large research project!) one may infer that – concerning the question of functionality –

(1) rewardlessness could be a secondary, a devolutionary, a degenerative condition in orchids in agreement with, for example the facts cited by Lönnig[10], Sanford[11], Behe[12], Leisola[13] and many others. Hence, originally, pseudocopulatory pollination seems to have been (not just rewardless as at present but) ***rewarding in possibly many more orchid species***. So, concerning the aspect of functionality, what has been elicited so far is this: The origin of rewardless systems appears to be more the result of a process of ***detoriation***, ***degeneration, decay and decline*** than of improvement, progress and evolution – the exact opposite of what Darwin and his followers had/have in mind.

Charles Darwin (1859): "Natural selection will never produce in a being anything injurious to itself, for natural selection acts solely by and for the good of each. No organ will be formed … for doing an injury to its possessor. If a fair balance be struck between the good and evil caused by each part, each will be found on the whole advantageous." – "Darwin…discussed at great length the evolution of fruits and flowers, **showing how traits that benefit animals first and foremost to increase plants' own reproductive success"** (Bronstein 2015, p. 12[14]). Now, ***the exact opposite is true in some 10,000 orchid species: no benefit for the animal pollinators*** **and selective disadvantages for both of them, the non-rewarding orchid (displaying lower pollination rates) and the pollinator (suffering fitness costs).**

(2) As to the act pseudocopulation itself as well as the possibility of originally non-rewarding species, I would like to refer the reader to check carefully the discussion by Markus Rammerstorfer (2006) on the topic of ***Spielerische Komplexität***[15].

Let us now critically inspect some further facts on the ID question:

Intelligent Design – an Alternative?

Closed functional circuits of anatomical and physiological components and correspondingly genetic programmes (to a large extent DNA encoded) are obviously necessary for the survival of these individual orchid plant forms and species.

[10] http://www.weloennig.de/AesV1.1.Dege.html, https://evolutionnews.org/2014/10/the_dog_delusio/, https://evolutionnews.org/2014/11/wolf_on_dogs_yo/

[11] http://www.geneticentropy.org/latest-development , https://www.amazon.de/Genetic-Entropy-John-C-Sanford/dp/0981631606

[12] Behe, M. J. (2010): Experimental evolution, loss-of-function mutations und the first rule of adaptive evolution. The Quaterly Review od Biology 85: 419-445.

[13] https://evolutionnews.org/2018/02/evolution-a-creative-trickster-heretic-bioengineer-says-no/

[14] Bronstein J L (Editor) (2015): Mutualism. Oxford University Press, Oxford.

[15] http://members.liwest.at/rammerstorfer/PlayfulComplexity.pdf

However, neither the emergence of such functionally complete systems, these perfect units usually consisting of multiple indispensable core components, can adequately, i.e. scientifically, be explained by “innumerable slight variations”, “infinitesimally small inherited variations” i.e. by mutational “steps not greater than those separating fine varieties” and “insensibly fine gradations” *principally* assumed by Darwin and the neo-Darwinians alike to have been chosen and preserved by natural selection, nor can the development of refrigerators by aimless factors in Wolfgang Wickler's illustration (*cf.* Part I).

Survival of the fittest only affects the possibilities and limits of variability within the functional systems of a species, whereby functionally largely equivalent (neutral) mutations are likely to play a significant role in the formation of many *morphological* plant and animal species. For some more points on this topic, *cf.* http://www.weloennig.de/CorCat.html and http://www.weloennig.de/Artbegriff.html. Regarding degeneration under relaxed natural selection, see http://www.weloennig.de/AesV1.1.Dege.html as for the limits of mutations http://www.weloennig.de/ShortVersionofMutationsLawof_2006.pdf

If, however, today's theories of evolution cannot scientifically, i.e. testably, answer the fundamental questions about the origin of new synorganized structures and systems and insistently still demand scientific acceptance with great trust and confidence (“evolution is not a theory; it is a fact”), then, where is the difference between an arbitrary request of faith without proof, being on the same level as the opinionated insistence of many churches to accept their respective dogmata?

On the question for an alternative Robert Nachtwey comments[16] (1950, p. 144):

> “The orchis flower can not have arisen from the coincidental summation of many discordant details, but only from the systematic assembly of its parts according to plan.”

In many respects, the research on *Coryanthes* and *Catasetum* continues to corroborate Professor Adolf Portmann's[17] conclusion on the origin of the orchids *Goryte* and *Ophrys* (1970, pp. 535, 545, 547 and p. 542, notes in square brackets of mine):

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[16]Same book as above. Original German Text: Die Orchisblüte kann nicht aus der zufälligen Summierung vieler zusammengewürfelter Einzelheiten, sondern nur aus der planmäßigen Zusammenfügung ihrer Teile entstanden sein.

[17] Renowned Swiss zoologist and philosopher (in the positive sense of the term): https://de.wikipedia.org/wiki/Adolf_Portmann (retrieved 2 July 2018). Original German Text (p. 535): “Die Fülle der Einrichtungen, durch die Orchideenblüten ausschließlich Männchen von Hautflüglern anlocken und als Bestäuber ausnützen, ist erstaunlich vielfältig. Der Weg ihrer Evolution ist in keinem Fall durch Etappen unserem Verständnis [im Sinne des Reduktionismus] zugänglich.”

P. 545: “Die Zweifel an der allgemeinen Geltung dieses Weges [der funktionalen Morphologie] zum Verstehen sind aber nicht leicht zu nehmen. Der Nachweis von Strukturen, die über das funktionsgemäße Ziel hinausschießen, die man deshalb auch als luxurierend, als hypertelisch bezeichnet hat, muß uns jeder allzu weitgehenden funktionalen Deutung gegenüber zurückhaltend stimmen.”

P. 547: “So, wie die Leistungssteigerung durch die Kybernetik nicht etwa die Erfindung des Neuen im menschlichen Dasein erklärt, so erklären auch die bedeutsamen Entdeckungen der Genetik nicht das Auftreten der komplexen Neuerungen, die über das hinausgehen, was die uns bekannten Prozesse genetischer Veränderung uns bisher vor Augen stellen.”

P. 542/543: “Die Entdeckung einer für alle Lebewesen einheitlichen Struktur, einer zur Selbstreplikation fähigen Überträgerin von Information von Schriftcharakter, hat wesentliche Konsequenzen. 1. Sie bestärkt unsere Gewissheit von der Einheit des Lebens, gilt doch das Prinzip für Virusstoffe, Bakterien, Planzen, Tiere gleichermaßen. 2. Sie führt damit die Autonomie des Lebens ausdrücklich vor Augen. Die Informationsvorgänge beruhen auf dynamischen Strukturen, die sich wohl der physikalisch–chemischen Stoffe bedienen, die aber selber nicht diesem Bereich angehören. ***So kann denn auch die Entstehung des Modus der Vererbung nicht aus den physikalisch-chemischen Strukturten allein erklärt werden***. “Es fragt sich, ob der logische Rang der Zufallsmutationen die Entdeckung neuer Prinzipien einschließt, die im physikalisch-chemischen Bereich nicht fassbar sind. Es ist sehr unwahrscheinlich, dass es solches mit einschließt.” So urteilt ein Philosoph und Soziologe, der aus der strengen Schule der physikalischen Chemie hervorgegangen ist: Michael Polanyi. 3. "Die besondere Struktur dieser besonderen Informationsprozesse, die uns den Vergleich mit unserer schriftlichen Verständigung aufdrängen, lenken den Blick auf die Phänomene, die wir im menschlichen Bereich als geistige Beziehung kennen, die ja auch bei uns nicht auf das wache Bewußtsein beschränkt ist. Die Diskussion um das Problem des Geistigen erhält neue Impulse.”

> "In no case is the path of their evolution accessible through stages [of innumerable small micro-evolutionary steps] to our understanding."
>
> "[T]he doubts about the general validity of this pathway [of functional morphology] for understanding should not be taken easily. The demonstration of structures that overshoot the functional goal, which therefore has been described as luxuriatious ["luxurierend"[18]], hypertelic, must make us cautious to any overly broad functional interpretation."
>
> "Just as increasing efficiency of cybernetics does not explain the invention of the new [des Neuen] in human existence, likewise the significant discoveries of genetics do not explain the appearance of complex innovations that go beyond what the known processes of genetic change have shown."
>
> "The discovery of a structure that is standardized for all living things, a vector of information displaying the characteristics of hand writing [Schriftcharakter] that is capable of self-replication, has significant consequences."

And on page 543, Portmann continues:

> "The special structure of these specific information processes, which force us to compare it with our written communication, draws attention to the phenomena that we know in the human realm as mental relationships, which are not limited to our alert consciousness. Thus, the problem of the spiritual [des Geistigen] receives new impulses."[19]

According to the facts and arguments presented above, there are numerous scientific reasons to apply the following words on the type concept of the paleontologist Oskar Kuhn and botanist Wilhelm Troll just as well on the subtype of orchids and probably also to the genera *Coryanthes* and *Catasetum*:

> "The type is, like any other form, as viewed *bona fide* morphologically[20], the realization of a plan into indifferent matter, which could just as well have assumed a different form. As a *Universal*, the type is objectively valid, the essence of things is conceived in it. From the point of view of naturalism, the origin of the types is the greatest mystery because of its nonadaptive character. Together with W. Troll we think that types are to be understood as "the thoughts of a creative power, which flows from the world-background into nature", which "generating new forms to matter, called into being the type-like basic forms"."[21]

See also *The Synthetic Theory of Evolution* and the *Intelligent Design Theory*: A Comparison (discussion of the main objections against ID regarding *Coryanthes* and *Catasetum*): http://www.weloennig.de/IntelligentDesign.html

But perhaps one could also think up 'an exceedingly plausible hypothesis of evolution' to explain the origin of the orchids, then refute it, to come up with another one, disprove that too etc., *ad infinitum*, ultimately demonstrating only the fundamental nonfalsifiability of the selection theory. Plausible hypotheses need not be true (Gould).

Interestingly, already about 150 years ago The Duke of Argyll has already formulated several objections against Darwin's hypothesis of a "race in gaining length between the nectary of the *Angraecum* and the proboscis of certain Moths" that have been clearly validated relatively recently:

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[18] Something like as superlative of luxuriary – so far I did not find an adequate Englisch expression.

[19] *Cf.* the books by Stephen C. Meyer , Michael J. Behe 1996/2006, 2007; Wolf-Ekkehard Lönnig 2005, 2012, 2014, 2015, 2016; Douglas Axe 2017; Tom Bethell 2017; Jonathan Wells 2017, and very many further authors.

[20] "realmorphologisch"

[21] Original German text: "Der Typus ist wie jede Gestalt, realmorphologisch gesehen, Verwirklichung eines Planes in indifferenter Materie, die ebensogut eine andere Gestalt hätte annehmen können. Als ein Universale ist der Typus objektiv gültig, in ihm wird das Wesen der Dinge gefaßt. Naturwissenschaftlich ist die Entstehung der Typen das größte Rätsel wegen ihres inadaptiven Charakters. Daher meinen wir mit W. Troll, daß Typen als »die Gedanken einer aus dem Welthintergrunde in die Natur hereinwirkenden, schöpferischen Macht« aufzufassen sind, welche »der Materie neuartige Ausprägungen verleihend, die typenhaften Grundformen ins Dasein rief."

George Campbell, 8th Duke of Argyll (1868/1871): *The Reign of Law*, pp. 43-50[22]:

> "[W]hen we come to the second part of Mr. Darwin's work, viz. the ***Homology of the Orchids***, we find that the inquiry divides itself into two separate questions, — first, the question what all these complicated organs are in their primitive relation to each, and, secondly, how these successive modifications have arisen; so as to fit them for new and changing uses. Now, it is very remarkable that of these two questions, that which may be called the most abstract and transcendental — the most nearly related to the Supernatural and Supermaterial — is again precisely the one which Darwin is able to solve most clearly. We have already seen how well he solves the first question — What is the use and intention of these various parts? The next question is, ***What are these parts in their primal order and conception?*** The answer is, that they are members of a **numerical group**, having a definite and still traceable order of **symmetrical arrangement**. They are expressions of a numerical idea, as so many other things — perhaps as all things — of beauty are. Mr. Darwin gives a diagram, showing the primordial or archetypal arrangement of Threes within Threes, out of which all the strange and marvellous forms of the Orchids have been developed, and to which, by careful counting and dissection, they can still be **ideally** reduced. But when we come to the last question — By what process of natural consequence have these elementary organs of Three within Three been developed into so many various forms of beauty, and made to subserve so many curious and ingenious designs? — ***we find nothing but the vaguest and most unsatisfactory conjectures***. Let us take one instance as an example. There is a Madagascar Orchis — the "*Angraecum sesquipedale*" — with an immensely long and deep nectary. How did such an extraordinary organ come to be developed? Mr. Darwin's explanation is this: The pollen of this flower can only be removed by the proboscis of some very large Moth trying to get at the nectar at the bottom of the vessel. The Moths with the longest probosces would do this most effectually; they would be rewarded for their long noses by getting the most nectar [aber in *Dendrobium* ausgetrickst?]; whilst, on the other hand, the flowers with the deepest nectaries would be the best fertilised by the largest Moths preferring them. Consequently, the deepest-nectaried Orchids, and the longest-nosed Moths, would each confer on the other a great advantage in the "battle of life." This would tend to their respective perpetuation, and to the constant lengthening of nectaries and of noses. But the passage is **so curious and characteristic**, that it is well to give Mr. Darwin's own words: -
>
> > "As certain Moths of Madagascar became larger, through natural selection in relation to their general conditions of life, either in the larval or mature state, or as the proboscis alone was lengthened to obtain honey from the *Angraecum*, those individual plants of the *Angraecum* which had the longest nectaries, (and the nectary varies much in length in some Orchids) and which, consequently, compelled the Moths to insert their probosces up to the very base, would be the best fertilised. These plants would yield most seed, and the seedlings would generally inherit longer nectaries; and so it would be in successive generations of the plant and Moth. Thus it would appear that there has been ***a race in gaining length between the nectary of the Angraecum and the proboscis of certain Moths***; but the **Angraecum has triumphed**, for it flourishes and abounds in the forests of Madagascar, and still troubles each Moth to insert its proboscis as far as possible in order to obtain the last drop of nectar. . . . We can thus," says Mr. Darwin, ***partially*** **understand** how the astonishing length of the nectary may have been acquired by successive modifications."
>
> It is indeed but a "partial" understanding, ***How came this Orchis to require any exact adjustment between the length of its nectary and the proboscis of an insect?*** This is not a general necessity even among the Orchids. "In the British species, such as *Orchis Pyramidalis*, it is not necessary that any such adjustment should exist, and thus ***a number of insects of various sizes are found to carry away the pollinia, and aid in the fertilisation***." This would obviously be the most favourable condition for all Orchids in the battle of life."

W.-E. L.: This analysis by George Campbell, Duke of Argyll, has been corroborated by recent research. Netz and Renner summarize (2017, p. 474)[23]:

> "***Long-tongued hawkmoths are polyphagous and take nectar from both long- and short-spurred flowers*** (Haber & Frankie, 1989; Agosta & Janzen, 2005; Martins & Johnson 2013; Johnson *et al.*, 2017). On Madagascar, *X. morgani praedicta* also visits the large and wide-open flowers of the baobab species *Adansonia perrieri* (Baum, 1995), and inflight cages in Madagascar and Erlangen, where Wasserthal (1993) kept a *praedicta* population for several

[22] https://archive.org/details/rei8gnlaw01argygoog

[23] Netz C and Renner S S (2017): Long-spurred Angraecum orchids and long-tongued sphingid moths on Madagascar: a time frame for Darwin'spredicted Xanthopan/Angraecum coevolution. *Biological Journal of the Linnean Society* **122**: 469–478.

> years, the moths, which reach ages of about 6 weeks, ***take nectar from many kinds of flowers with different spur lengths*** (Wasserthal, 1997)."

Recall, please, also Anna Vlašánková et al. (2017)[24], cited in Part I, p. 48:

> "Both Darwin's coevolutionary race hypothesis (Darwin, 1862) and the pollinator shift hypothesis (Wasserthal, 1997; Whittall & Hodges, 2007) predict that during evolution of long-spurred flowers, the short-proboscid pollinators are excluded from the pollination system, and the long-proboscid pollinators are expected to be the only ones producing selection pressure on flower traits. By contrast, our results show that **even visitors with shorter proboscises can be effective pollinators** and that the possible selection pressures on flower traits can therefore be much more diverse."

As to the Duke's question *per se*: "How came this *Orchis* to require any exact adjustment between the length of its nectary and the proboscis of an insect?" I would like to refer the reader *encore* to Part I, p. 48 (f) on *Arms race and fine-tuned co-evolution*: http://www.weloennig.de/BeautifulFactsPartI.pdf

George Campbell continues:

> "Does not the hypothesis, then, begin by assuming the very condition of things for which it professes to account? We must start with this Madagascar Orchis ***aleady in possession of a larger nectary than other species,*** and with a structure already depending on particular Moths **also already existing**, and already provided with probosces of nicely adjusted length. If the nectaries began first to lengthen, how came the Moths not to leave them for other flowers? And if, on the contrary, they began to shorten, how came they not to be favoured and resorted to by other Moths of a smaller size?
>
> Can we assume that somehow there were **always ready some Moths still larger to favour the longer variety**, and that somehow also there were no smaller Moths to favour the shorter? ***Why should the race in this particular species be always in the direction of nectaries getting longer, and not rather in the direction of nectaries getting shorter?**** Obviously, **the same hypothesis might be so turned as to account for either result with equal ease**, and therefore it does riot account at all for one of those results as against the other. And then there is a larger question than any of these which remains behind. How came Orchids to be dependent at all upon insects for fertilisation?
>
> It cannot he argued that this is a necessity arising mechanically from the nature of things, because, as we are truly told by an eminent naturalist who warmly supports the Darwinian hypothesis, "***exactly the same end is attained in ten thousand other flowers" which do not possess the same structure***.' But what is the bearing of this fact upon the theory? Is it not this — that the origin of such curious structures, and complicated relations, **cannot be accounted for on any principle of mere mechanical necessity**? Elementary forces may indeed always be detected, for they are always present. But the manner in which they are worked ***irresistibly suggests some directing power, having as one of its aims mere increase and variety in that ocean of enjoyment which constitutes the sum of Organic Life***, some idea of this kind, however unconsciously, however reluctantly conceded, lurks in every form of words in which the facts of science can be generalised to the mind. Thus we find Mr. Wallace himself saying, in the same paper which he regrets the language of Mr, Darwin, that the conception he prefers is, **that the "contrivances" referred** to" are some of the results of those general laws which "Creation by Law," p, 474, were so co-ordinated at the first introduction of Life upon the earth, **as to result necessarily in the utmost possible development of varied forms**."
>
> Eliminating the word "necessarily," which, if it has any meaning, does not apply, as we have seen, to the case of the Orchids, this language presents an intelligible idea. It satisfies the mind precisely in proportion as it brings into view, however distant, the attributes of Mind, and gives us a glimpse of "the reason why," The production of variety in beauty and in enjoyment is the purpose which those words suggest. In like proportion is Mr. Darwin's language the truest and the best His explanations of the mechanical methods by which a wonderful Orchis has come to be are indeed, as he himself says, with great candour, "***partial***" and partial only. How different from the clearness and the certainty with which Mr. Darwin is able to explain to us the use and intention of the various organs! or the primal idea of numerical order and arrangement which governs the whole structure of the flower!

[24] Anna Vlašánková, Eliška Padyšáková, Michael Bartos, Stěpán Janeček (2017): The nectar spur is not only a simple specialization for long-proboscid pollinators. *New Phytologist* 215: https://nph.onlinelibrary.wiley.com/doi/pdf/10.1111/nph.14677

> It is the same through all Nature. Purpose and intention, or ideas of order based on numerical relations, are what meet us at every turn, and are more or less readily recognised by our own intelligence as corresponding to conceptions familiar to our own minds. We know, too, that these purposes and ideas are not our own, but the ideas and purposes of Another - of One whose manifestations are indeed superhuman and supermaterial, but are not "supernatural," in the sense of being strange to Nature, or in violation of it.
>
> The truth is, that there is no such distinction between what we find in Nature, and what we are called upon to believe in Religion, as that which men pretend to draw between the Natural and the Supernatural. It is a distinction purely artificial, arbitrary, unreal. Nature presents to our intelligence, the more clearly the more we search her, the designs, ideas, and intentions of some
>
> "Living Will that shall endure,
> When all that seems shall suffer shock."
>
> *Footnote: "Mr. Wallace sees no difficulty whatever in making any supposition of this kind which the Theory may require. "Now let us start," he says, "from the time when the nectary was only half its present length, or about six inches, and was ***chiefly fertilized by a species of Moth*** *which appeared at the time of the plants flowerings and whose proboscis was of the same length*."" (Italics beginning with "*which*…" by George Campbell.)

As for testability and falsifiability of the intelligent design theory, see please http://www.weloennig.de/NeoC.html and (to be applied on the scientific level for ID) and http://www.weloennig.de/Popper.html[25]. See, moreover, the clear criteria as formulated by Michael Behe (2016) and further authors mentioned in the footnote.[26]

As a little reminder: Some further photographs of orchid genera already depicted in Part I:

Phalaenopsis hybrid with variegated flowers
(pollination by deceit)

[26] Michael Behe (2016): https://evolutionnews.org/2016/10/philosophical_o/
Check also Discovery Institute (2005): http://www.discovery.org/scripts/viewDB/filesDB-download.php?id=494; Jonathan Witt (2016) https://evolutionnews.org/2016/11/intelligent_des_31/

Above: *Phalaenopsis*, same inflorescence (somewhat enlarged), backlit photograph. Below left. Habitus of the plant. Right: Vegetative part including roots.

Above: *Paphiopedilum* hybrid[27]. Below left: *Vanda coerulea* hybrid. Right: *Brassia* (all: pollination by deceit)

Back to Internet Library

[27] Robert W. Pemberton (2013, p. 66): "Despite their wide geographical distribution, diverse habitats, and sizes, all species have the same basic floral morphology and pollination mechanism (Cribb 1987, 1997b; Bernhardt and Edens-Meier 2010; Edens-Meier et al., in press). Species are self-compatible but require insects to transfer pollen from the anther to the stigma (Edens-Meier et al. 2011). None of their flowers is known to produce nectar or other rewards for pollinators and so are pollinated by deceit (Nilsson 1979; Edens-Meier et al., in press)."
See: http://lankesteriana.org/Lankesteriana/Vol.%2013/Lankesteriana%2013(1-2)%202013/13_Pemberton_pollination_of_slipper_orchids.pdf