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Haeckel's "Biogenetic Law" and Vestigialty: Is Man "*a Veritable Walking Museum of Antiquities*"?

Discussing One of the Most Egregious Contradictions Within the Theory of Evolution (Plus "Breaking News" on Kidney Development)

"There are, according to Wiedersheim, no less than 180 vestigial structures in the human body, sufficient to make of a man a veritable walking museum of antiquities."

Horatio Hackett Newman (1925)

Evolutionary Zoologist

"Along with Frank Rattray Lillie and Charles M. Child, he is credited with building the University of Chicago's zoology department into one of the best respected departments of its kind."[1]

"Biologist Horatio Newman, testifying in favor of evolution during the Scopes trial in 1925, wrote that "there are, according to Wiedersheim, no less than 180 vestigial structures in the human body, sufficient to make of a man a veritable walking museum of antiquities." Some of these have since been shown to have at least a minimal function, but most are truly useless rudiments of once-functional systems."

Donald R. Prothero (2020)

Evolutionary Geologist and Paleontologist

Published several books on evolution. From 1991 to 2001 he was Associate Professor and since 2001 he has been Professor of Geology at Occidental College [Los Angeles]"[2]

"It may be said that natural selection is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and in organic conditions of life." Nature "can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life."

Charles Darwin (1859/2023)

On the Origin of Species by Means of Natural Selection, Or, The Preservation of Favoured Races in the Struggle for Life. 1859, p. 83[3]

His Entire Work here: http://darwin-online.org.uk/contents.html

"In the genetic program, therefore, is written the result of all past reproductions, the collection of successes, since all traces of failures have disappeared. The genetic message, the program of the present-day organism therefore resembles a text without an author, that a proof-reader has been correcting for more than two billion years, continually improving, refining and completing it, gradually eliminating all imperfections."

François Jacob (1973)

Evolutionary Molecular Biologist and Nobel laureate

Concerning his career, see https://en.wikipedia.org/wiki/Fran%C3%A7ois_Jacob[4]

[T]his so-called "Biogenetic Law" was a catastrophic error in the history of natural sciences. It has set biology back a full century in theoretical and practical terms. In the theoretical field, through the assumption that a patent solution had already been found with the comparative-anatomical determination of similarities in order to explain developmental processes in general. In the practical field, because it was thought that every creative force and thus the psyche of the human being itself could now simply be understood as a repetition, i. e. as a [phylogenetic] reproduction.[5]

Erich Blechschmidt (1968 and 2011similarly: 2004 and 2012)

Human Embryologist

Professor and Director of the Institute of Anatomy, University of Göttingen (1942 – 1973)[6]
Lived from 1904-1992. His main works are being republished at present (German, English, French)
Discussed with me the basic questions of Haeckel's "Biogenetic Law" at the end of the 1970s

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[1] **Almost all highlighting in the typeface in this article by W.-E. L** "Horatio Hackett Newman (March 19, 1875 – August 29, 1957) was an American zoologist and geneticist who taught at the University of Chicago. Along with Frank Rattray Lillie and Charles M. Child, he is credited with building the University of Chicago's zoology department into one of the best respected departments of its kind." https://en.wikipedia.org/wiki/Horatio_Newman (retrieved 24 July 2023). - "Newman journeyed to Dayton, Tennessee, in 1925 to testify at the trial of John T. Scopes. Although the judge did not allow expert scientific witnesses to testify in court, Newman was one of seven scientists whose statements were placed in the trial record." https://www.encyclopedia.com/science/dictionaries-thesauruses-pictures-and-press-releases/newman-horatio-hackett (perhaps one of these little ironies of life "Hackett": a bit like Haeckel).
Cf. also https://www.bionity.com/en/encyclopedia/Robert_Wiedersheim.html

[2] Donald R. Prothero (2020): The Story of Evolution in 25 Discoveries: The Evidence and the People Who Found It. Columbia University Press, New York. See perhaps also the still up to date comment by Casey Luskin on one of Prothero's earlier assertions https://evolutionnews.org/2013/01/survival_of_the_1/

[3] In the following editions starting 1860 he added: "It may metaphorically be said that" Eleganse Edition 7 Mar 2023. http://darwin-online.org.uk/contents.html

[4] As for the citation, see https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4512536/ (2015)

[5] The Original German Text below in the main text.

[6] The results of Blechschmidt's research were also represented by plastic models (named "*Humanembryologischen Dokumentationssammlung Blechschmidt*" shown at the ZENTRUM ANATOMIE UNIVERSITÄT GÖTTINGEN: https://sammlungen.uni-goettingen.de/sammlung/slg_1000/. This is an **absolutely unique collection publicly accessible** at this *Centre for Anatomy at Göttingen University*: Each of the 61 models being about 65 to 75 cm high (including "Modellmontage about 180 cm), They show captivating details of development of the human embryo from fertilization to the end of the 8th week of pregnancy.

When carefully studying the citations just presented above, the perceptive reader will already have recognized the depth of what I have called 'one of the most ***egregious contradictions within the theory of evolution***', now to be more closely addressed in the present article – just to sum up that contradiction in simple terms:

> On the one hand, we find omniscient and omnipotent natural selection that sifts out absolutely anything and everything that is superfluous, detrimental or, in one word, bad, – and on the other hand, we find the human being who excels to be "a veritable walking museum of antiquities" ***full of*** completely/utterly/entirely superfluous and energetically expensive/high-cost evolutionary rudiments from junk DNA to egg to embryo and throughout all his life. And this is also assumed to be most certainly true not only for humans, but virtually for all living beings on this beautiful blue planet earth.

In response to my question about an intelligent cause for the tremendously complex structures of living organisms, Ernst Mayr[7] answered: "[Natural] Selection is the intelligence" ("Die Selektion ist die Intelligenz")[8].

Nobel Laureate Konrad Lorenz describes his view on Darwin's theory of descent by natural selection in the following illustrious terms:

> "In the history of human advances in knowledge, never before has a doctrine established by a single man, under the crossfire of thousands of independent tests drawn up from various directions, **proved to be so completely true** as Charles Darwin's theory of descent. It is more valid than ever today what Otto zur Strassen wrote about it more than forty years ago in his introduction to the "Neuen Brehm": "**Everything we known agrees perfectly with it, nothing speaks against it**."[9]

But "omnipotent natural selection"? Has this really been taught by Darwin and most of his forthright followers over the last 165 years or so?[10] The answer is a resounding YES!

During the last decades, among the voices in favor of Darwin's theories have been best-selling authors like Sir David Attenborough, Francisco J. Ayala, Jerry Coyne, Richard Dawkins, Daniel Dennett, Douglas J. Futuyma, Ernst Mayr, or, in the approving words of John C. Avise, *Distinguished Professor of Ecology & Evolution, University of California, Irvine* (1998, p. 208), "Natural selection comes **close to omnipotence**", and professor Christopher Exley (2009, p. 589) from Keele University is, indeed, convinced that "both the beauty and the brilliance of natural selection are reflected in its **omnipotence** to explain the myriad observations of life".

Richard Dawkins remarks in ardent admiration and almost fervent worship:

> "Never were so many facts explained by so few assumptions. Not only does the Darwinian theory command **superabundant power** to explain. Its economy in doing so has a sinewy elegance, a poetic beauty that outclasses even the most haunting of the world's origin myths."[11]

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[7] Co-founder of the "modern synthesis" better known as Neo-Darwinism.
[8] *Cf.* http://www.weloennig.de/AesV3.html
[9] About the truth of the theory of descent, pp. 13 -31 in: Evolution. H. v. Ditfurth (ed.) Hamburg. Original German Text (1975, p. 31): "In der Geschichte menschlichen Wissensfortschrittes hat sich noch nie die von einem einzigen Manne aufgestellte Lehre unter dem Kreuzfeuer von Tausenden unabhängiger und von den verschiedenen Richtungen her angestellten Proben **so restlos als wahr erwiesen** wie die Abstammungslehre Ch. Darwins. Mehr als je gilt von ihr heute, was Otto zur Strassen vor mehr als vierzig Jahren in seiner Einführung zum "Neuen Brehm" über sie schrieb: "**Alles uns jetzt Bekannte fügt sich ihr zwanglos ein, nichts spricht gegen sie**." (Über die Wahrheit der Abstammungslehre, pp. 13-31 in: Evolution. H. v. Ditfurth (Hrsg.) Hamburg.)
[10] Counting from 1859 onwards. Several of Darwin's more widely known followers of the 19th and 20th century on the omnipotence of natural selection are mentioned in http://www.weloennig.de/OmnipotentImpotentNaturalSelection.pdf
[11] R. Dawkins (1995, p. XI): River out of Eden; Basic Books, New York. – Many can relate to Dawkin's feelings: Die oben zitierten Worte Darwins z. B. zeichnen sich für manche Leser durch eine ungeheure Suggestivität aus, deren Power über die Abstrusität seiner Aussagen völlig hinwegtäuschen kann.

I have discussed this question of the omnipotence of natural selection in more detail in my article *Evolution by Natural Selection – Unlimited and Omnipotent? Some ironic and factual comments on today's main evolutionary hypothesis*:

http://www.weloennig.de/OmnipotentImpotentNaturalSelection.pdf

May I be allowed to ask the impartial reader to carefully and meticulously study this essay, which is thoroughly documenting the gist of that answer in the affirmative.

Recall please from the introductory citations Darwin's assertion that:

> (1859, p. 84) "It may be said that natural selection is **daily and hourly scrutinizing**, throughout the world, every variation, even the slightest; **rejecting that which is bad**, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and in organic conditions of life."[12]
>
> And a few sentences before: Nature "can act on every internal organ, **on every shade of constitutional difference**, on the whole machinery of life. […] Every selected character is fully exercised by her" (1859, p. 83).[13]
>
> Moreover, "In living bodies, variation will cause the slight alterations, generation will multiply them almost infinitely, and natural selection will pick out **with unerring skill** each improvement." (1859, p. 189/1872, p. 146).

In his text on the origin of the eye he stated similarly (see discussion in http://www.weloennig.de/AuIAbII.html, paragraph W):

> "Further we must suppose that there is a power, represented by natural selection or the survival of the fittest, **always intently watching each slight alteration**[14] in the transparent layers; and carefully preserving each which, under varied circumstances, in any way or in any degree, tends to produce a distincter image. We must suppose each new state of the instrument to be multiplied by the million; each to be preserved until a better one is produced, and then **the old ones to be all destroyed**."

And Darwin (1859, p. 469/1872, pp. 412 and 66):

> "What limit can be put to this power, acting during long ages and **rigidly scrutinising** the whole constitution, structure, and habits of each creature, - favouring the good and **rejecting the bad**? I can see no limit to this power, in slowly and beautifully adapting each form to the most complex relations of life."
>
> Moreover "characters and structures, which we are apt to consider as of very trifling importance, may thus be acted on."

And what have biologists and several philosophers to say today concerning "rejecting what is bad"?[15] Some examples: "*How Natural Selection works*" according to the University of Utah (2023):

> "Natural selection is best known for favoring helpful traits and making them more common in a population. **But it has an even bigger job: weeding out harmful traits**."[16]

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[12] And he intriguingly added that the **process was invisible**: "We see nothing of these slow changes in progress, until the hand of time has marked the long lapse of ages, and then so imperfect is our view into long past geological ages, that we only see that the forms of life are now different from what they formerly were."

[13] Ben Bradley (2022) on *Natural selection according to Darwin: cause or effect*? After citing this assertion of Darwin, Bradley comments:
"Writing in this vein, Darwin (1859a, pp. 85, 156) cast **natural selection as a 'power,' which 'acts by life and death,' and so 'causes' extinction, for example**. Not only antagonists (like Adam Sedgwick, 1859), but even allies like Charles Lyell (1860a) and Joseph Hooker (1860) complained Darwin had cast natural selection as a power akin to a deity, a 'deus ex machina' as Hooker (1862) later put it. Darwin denied the claim. (And later editions of Origin qualified his use of anthropomorphic language.) Yet both the rhetorical organisation of his argument, and the fact that his book used an ordinary language immanently 'imbued with intentionality,' **weakened these denials** (Beer, 2000, p. 81)." https://link.springer.com/article/10.1007/s40656-022-00485-z. I came across this paper on 2 August 2023 in the afternoon. I didn't know of Lyell's and Hooker's "complaints" when I in 1976 commented: „Die natürliche Zuchtwahl wird ja hier fast mit göttlicher Allwissenheit gleichgesetzt…"

[14] In his first edition of 1859 he had added: "…intently watching each slight **accidental** alteration…"

[15] One should note, however, that the ensuing sources differentiate and relativize natural selection due to further factors like neutral variation in their overall comments.

[16] https://learn.genetics.utah.edu/content/change/hownaturalselectionworks (retrieved 2 August 2023)

Columbia [University] News (2017): "*Large-scale Study of Genetic Data Shows Humans Still Evolving*":

> Headline: "*Researchers Find a Drop in Some Harmful Genetic Mutations in Longer-lived People"*
> "In a study analyzing the genomes of 210,000 people in the United States and Britain, researchers at Columbia University find that the genetic variants linked to Alzheimer's disease and heavy smoking are less frequent in people with longer lifespans, **suggesting that natural selection is weeding out these unfavorable variants in both populations**."[17]

Now, "Scitable by *nature* Education" on "*Causes of Negative Selection*" (2008) by Laurence Loewe (School of Biological Sciences, University of Edinburgh, Scotland, UK):

> "Because more DNA changes are harmful than are beneficial, ***negative selection plays an important role in maintaining the long-term stability of biological structures by removing deleterious mutations***. Thus, negative selection is sometimes also called **purifying selection or background selection**. One key reason why this form of selection is so prevalent is the success of evolution in optimizing biological structures: As soon as a system has been improved, there is the danger of losing that improvement by a deleterious mutation. Purifying selection makes sure that deleterious mutations cannot take over a population and that any improved structures—once fixed in a population—are maintained as long as they are needed."[18]

And Wikipedia (2023), where many people first look for an answer:

> "[N]atural selection often results in the maintenance of the status quo by **eliminating less fit variants**." … "Natural selection reduces genetic variation by **eliminating maladapted individuals**, and consequently the mutations that caused the maladaptation."[19]

To essentially repeat my question: If man were "*a Veritable Walking Museum of Antiquities*" full of completely/utterly/entirely superfluous and energetically expensive/high-cost evolutionary rudiments' – why has omniscient and omnipotent natural selection 'that sifts out absolutely anything and everything that is superfluous, detrimental or, in one word, bad', not removed and fully eliminated all such rudiments in the millions of years of the assumed human evolution and also abolished them in his asserted animal ancestors in the hundreds of million years leading to, for example, the australopithecines, not to speak of the millions of other species?

And now Darwin's explanation (1872, p. 131) in extreme contradiction to what he otherwise has to say on the subject of natural selection (see above): "***Rudimentary organs, from being useless*, are not regulated by natural selection, and hence are variable**."

Even when we take into account that many contemporary biologists, not least the population geneticists[20], have a much more differentiated and less totalitarian view of natural selection than Darwin and his outspoken followers like Attenborough, Ayala, Coyne, Dawkins, and many other well-known authors (*cf*. above) – *do they not all agree that 'natural selection is weeding out harmful traits and unfavorable variants'* in plant and animal populations, that "negative selection plays an important role in maintaining the long-term stability of biological structures *by removing deleterious mutations*",

[17] https://news.columbia.edu/news/large-scale-study-genetic-data-shows-humans-still-evolving (retrieved 2 August 2023)
[18] https://www.nature.com/scitable/topicpage/negative-selection-1136/ (also retrieved 2 August 2023)
[19] https://en.wikipedia.org/wiki/Natural_selection (retrieved 2 August 2023)
[20] http://www.weloennig.de/NaturalSelection.html (see subheading: *Natural Selection, Population Genetics, and the Neutral Theory*). "If a new mutation has a selective advantage of *S* in the heterozygote in which it appears, then the chance is only 2*S* that the mutation will ever succeed in taking over the population. So, ***a mutation that is 1 percent better in fitness than the standard allele in the population will be lost 98 percent of the time by genetic drift***."

"*eliminating less fit variants*", "*eliminating maladapted individuals*"? Or, perhaps also, that many will agree with François Jacob's dictum that "The genetic message resembles a text without an author…that a proof-reader has been correcting for more than two billion years, continually improving, refining and completing it, ***gradually eliminating all imperfections***."

How, then, can man be "*A Veritable Walking Museum of Antiquities*", full of functionless, degenerate, atrophied, rudimentary structures and organs?

And how, then, can a contemporary/up-to-date biology professor write a book of 256 pp. on *Human Errors: A Panorama of Our Glitches, from Pointless Bones to Broken Genes*? And publish it by a well-known press for students and teachers?[21] (Incidentally with applause by Ian Tattersall[22] and nearly 90% of 882 customer reviews as well as praise in leading scientific and popular magazines around the globe.)[23] Or, just to take another example: *Inside the Human Genome: A Case for Non-Intelligent Design* (222 pp.)[24]

"Vestigiality is the retention, during the process of evolution, of genetically determined structures or attributes that have lost **some *or all* *of the ancestral function in a given species***."[25] Or, in the words of Prothero on such structures that "**some** of these have since been shown to have at least a minimal function, but **most** ***are truly useless rudiments of once-functional systems***" (see above).

However, what would we expect according to an intelligent design theory?

First a perfect start possibly followed by certain degrees of degeneration due to mutational losses of functions of structures and capabilities unnecessary for life forms and species to further survive under defined environmental conditions, but often advantageous for adaptations in new habitats (prime example: Loss of melanin production in animals of the polar regions).

Natural selection is differentially relaxed[26] (most certainly *not* "daily and hourly scrutinizing, throughout the world, every variation, even the slightest;

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[21] https://en.wikipedia.org/wiki/Houghton_Mifflin_Harcourt and https://www.hmhco.com/about-us (90% of U.S. K–12 schools use HMH core, intervention, and supplemental programs; 50M students in 150 countries use HMH's research-backed learning programs.) Retrieved 5 August 2023.

[22] https://de.wikipedia.org/wiki/Ian_Tattersall

[23] **Nathan H. Lents** (2018): https://www.amazon.de/Human-Errors-Panorama-Glitches-Pointless/dp/1328974693 (In a clear denial of/contradiction to Darwin's assertions on the efficacy of natural selection (see above): "Evolution has not perfected our species—far from it. The human body, wondrous and beautiful as it may be, ***is cluttered with glitches and inefficiencies***, the messy byproducts of evolution's creative process. Natural selection is a blind, groping process, one that frequently produces terrible problems in addition to workable prototypes." https://rusoffagency.com/book-info/wsj-essay/ (2018)

For a systematic scientifically fine **refutation of that book's goals** see, for example:
Michael Denton (2022): The Miracle of Man: The Fine Tuning of Nature for Human Existence (Privileged Species Series) 256 pp. Discovery Institute Press, Seattle, WA. https://www.amazon.de/-/en/Michael-Denton/dp/1637120125 ("The human person as revealed by modern science is no contingent assemblage of elements, an irrelevant afterthought of cosmic evolution," Denton writes. "Rather, our destiny was inscribed in the light of stars and the properties of atoms since the beginning. Now we know that all nature sings the song of man. Our seeming exile from nature is over." **Films**: https://privilegedspecies.com/
David Galloway (2021): Design Dissected: Is the Design Real?: A Clinical Look at Life's Complexity, Design and Ultimate Causation. https://www.amazon.de/Design-Dissected-Real-David-Galloway/dp/1914273001/
Steve Laufmann, Howard Glicksman (2022): Your Designed Body. Discovery Institute Press, Seattle, WA. https://www.amazon.de/Your-Designed-English-Steve-Laufmann-ebook/dp/B0BLVVK6L1
"In Your Designed Body, systems engineer Steve Laufmann and physician Howard Glicksman explore this extraordinary system of systems encompassing thousands of ingenious and interdependent engineering solutions. They present a compelling case that no gradual evolutionary pathway could have achieved this, and that instead ***it must be the handiwork of a masterful designer-engineer***."

[24] **John C. Avise** (2010): https://www.amazon.de/-/en/John-C-Avise/dp/0195393430 Avise "is Distinguished Professor of Ecology and Evolutionary Biology, at the University of California, Irvine, and an elected member of both the National Academy of Sciences and the American Academy of Arts and Sciences." For valid **critiques of the book** see, for example: https://evolutionnews.org/2010/03/a_malodorous_argument_for_darw/ and/or https://uncommondescent.com/intelligent-design/a-2010-oxford-u-press-book-on-unintelligent-design-seems-so-dated-now/ as well as https://evolutionnews.org/2011/05/has_forbescom_critic_of_read_t/ https://discoveryinstitutepress.com/book/the-myth-of-junk-dna/ and a long series of scientific articles discussing functions of the so-called "Junk DNA" starting 2006 and continued so far (when this article was written) up to August 2023 and probably cont.: https://evolutionnews.org/tag/junk-dna/ (retrieved 6 August 2023).

[25] https://en.wikipedia.org/wiki/Vestigiality

[26] http://www.weloennig.de/NaturalSelection.html (Mayr's examples are partly irrelevant or outdated: see for example http://www.weloennig.de/BistonA.html)

rejecting that which is bad, preserving and adding up all that is good" etc.). See a series of examples here: (1) *Degeneration im Organismenreich* and (2) *Inselpopulationen*:

http://www.weloennig.de/AesV1.1.Dege.html
http://www.weloennig.de/AesV1.1.Ipop.html

See also Michael J. Behe (2019): *Darwin Devolves: The New Science About DNA That Challenges Evolution*. HarperOne, New York.[27] And a series of additional articles by Behe here https://evolutionnews.org/author/mbehe/ (from 2019 to 2023 already more than 30 articles, most of them on the topic of 2019).

I have extensively discussed the topic of natural selection from 1971 onwards up to the present in most of my interviews, podcasts, papers, articles and books (more than one hundred): see please http://www.weloennig.de/internetlibrary.html and http://www.weloennig.de/literatur1a.html

The overall result of these studies is that differentially relaxed natural selection 'allows' losses of functions/disintegration/degeneration/decay to a certain degree that can (but does not necessarily) happen within species, genera and families[28], so that vestiges of former functions and structures may be found (prime example perhaps the flightless Galapagos cormorant[29], and many further flightless island birds and insects[30]).

However, according to Haeckel's "Biogenetic Law" ontogeny recapitulates phylogeny – not only within the limits up to a family but without any systematic limits up to the entire postulated evolutionary tree of life, including, for example, structures like the 'tail bone', the appendix, the 'gill slits' and many more.

And Darwin was especially happy with embryology not only in man but also in, for example, the crustacea. In the words and citations of Dembski and Wells (2007, pp. 136/137): "He "concluded that early embryos "*show us, more or less completely, the condition of the progenitor* ***of the whole group in its adult state***."[31] In other words, similarities in early embryos not only demonstrate that they are descended from a

[27] https://www.amazon.de/-/en/Michael-J-Behe/dp/0062842617
[28] Family: See please footnote 57, p. 25: http://www.weloennig.de/AngiospermsLivingFossils.pdf
[29] "The flightless cormorant (*Nannopterum harrisi*), also known as the Galapagos cormorant, is a cormorant endemic to the Galapagos Islands, and an example of the highly unusual fauna there. It is unique in that it is ***the only known cormorant that has lost the ability to fly***. It was placed in its own genus, *Nannopterum*, but then was **later placed with most of the other cormorants in the genus *Phalacrocorax***. A 2014 study supported reclassifying it and two other American cormorant species **back into *Nannopterum***. The IOC followed this classification in 2021." https://en.wikipedia.org/wiki/Flightless_cormorant (retrieved 9 August 2023). So, in spite of the Darwinian tendency to overstate/exaggerate the differences in order to illustrate overall evolution (which, on a closer look, often turns out to be degeneration), the losses of functions and structures remain within the family Phalacrocoracidae. Interestingly, "The flightless cormorant is the largest extant member of its family, 89–100 cm (35–39.5 in) in length and weighing 2.5–5.0 kg (5.5–11.0 lb), and its **wings are about one-third the size** that would be required for a bird of its proportions to fly. The **keel on the breastbone**, where birds attach the large muscles needed for flight, is **also significantly reduced**. …These cormorants evolved on an island habitat that was free of predators. Having no enemies, taking its food primarily through diving along the food-rich shorelines, and not needing to travel to breeding grounds, the bird eventually became flightless." (Same Wikipedia article)
[30] For more examples, see again: http://www.weloennig.de/AesV1.1. Dege.html and http://www.weloennig.de/AesV1.1.Ipop.html (here including possible compensation by increase/proliferation of formerly less pronounced structures) and http://www.weloennig.de/AesIV2.A.5.html (Die geographische Isolation)
[31] Origin 1872, p. 395: http://darwin-online.org.uk/content/frameset?itemID=F391&viewtype=text&pageseq=1 Full quotation: "On the other hand it is highly probable that with many animals the embryonic or larval stages show us, more or less completely, **the condition of the progenitor of the whole group in its adult state.** In the great class of the Crustacea, forms wonderfully distinct from each other, namely, suctorial parasites, cirripedes, entomostraca, and even the malacostraca, appear at first as larvæ under the nauplius-form; and as these larvæ live and feed in the open sea, and are not adapted for any peculiar habits of life, and from other reasons assigned by Fritz Müller, it is probable **that at some very remote period an independent adult animal, resembling the Nauplius**, existed, and subsequently produced, along several divergent lines of descent, the above-named great Crustacean groups. So again it is probable, from what we know of **the embryos of mammals, birds, fishes, and reptiles**, that these animals are the modified descendants of some ancient progenitor, **which was furnished in its adult state with branchiæ, a swim-bladder, four fin-like limbs, and a long tail, all fitted for an aquatic life**."

common ancestor, but they also ***reveal what that ancestor looked like***. Darwin considered this "*by far the strongest single class of facts in favor of*"[32] his theory".[33]

With regard to the "leading facts of embryology" of his time, i.e. especially Haeckel's "Biogenetic Law" and corresponding illustrations, he also commented (1872, p. 396):

> "…it seems to me, the leading facts in embryology, which are **second to none in importance**, are explained on the principle of variations in the many descendants from **someone ancient progenitor**, having appeared at a not very early period of life, and **having been inherited at a corresponding period**."

And 1877, p. 25 (somewhat more cautious but still almost totally wrong):

> "In order to understand the **existence of rudimentary organs**, we have only to suppose that a former progenitor possessed the parts in question in a perfect state, and that under changed habits of life they became greatly reduced, either from simple disuse, or through the natural selection of **those individuals which were least encumbered with a superfluous part**, aided by the other means previously indicated.
>
> Thus, we can understand how it has come to pass that man and all other vertebrate animals have been constructed on the same general model, **why they pass through the same early stages of development**, and **why they retain certain rudiments in common**. Consequently, we ought frankly to admit their community of descent: to take any other view, is to admit that our own structure, and that of all the animals around us, is a mere snare laid to entrap our judgment." [34]

Recall please carefully the Darwin citations at the beginning of the present article about natural selection that "is daily and hourly scrutinizing, throughout the world, every variation, ***even the slightest; rejecting that which is bad***", or F. Jacob "…gradually eliminating all imperfections". And, in contrast, Prothero on Newman's and Wiedersheims's 180 vestigial structures in the human body, "most of which are truly useless rudiments of once-functional systems" (Prothero), "***sufficient to make of a man a veritable walking museum of antiquities***" (Newman) and consider them in the context of the topic of the present article on *One of the Most Egregious Contradictions Within the Theory of Evolution.*

In what may perhaps be called a modern version of that 'law' in the context of *Evo-devo* (for example by berkeley.edu), although presenting the now corrected viewpoint of "**not recapitulation**" (subtitle) we are nonetheless informed about "ancestral characters" as follows:

> "Ancestral characters **are often**, but not always, **preserved** in an organism's development. For example, both chick and human embryos go through a stage where they have slits and arches in their necks like the gill slits and gill arches of fish. These structures are not gills and do not develop into gills in chicks and humans, but the fact that they are so similar to gill structures in fish at this point in development ***supports the idea that chicks and humans share a common ancestor with fish***. Thus, developmental characters, along with other lines of evidence, can be used for constructing phylogenies."[35]

Now, Haeckel's "Biogenetic Law" of 1866 has been so meticulously/ thoroughly/exhaustively disproved by so many qualified authors in so many papers and books over the last some 160 years that I am not trying to repeat these arguments and

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[32] https://www.darwinproject.ac.uk/letters/darwins-life-letters/darwin-letters-1860-answering-critics: "By the end of 1860, Darwin was disheartened that so few of his reviewers had noticed what he considered to be 'the strongest single class of facts in favour of change of form', namely those of embryology (letter to Asa Gray, 10 September [1860])." The full letter itself: https://www.darwinproject.ac.uk/letter/DCP-LETT-2910.xml

[33] https://archive.org/details/WilliamA.DembskiJonathanWellsTheDesignOfLifeDiscoveringSignsOfIntelligenceInBiol By the way: **Excellent critique** of Haeckel's law there. See also: https://evolutionnews.org/2007/12/darwins_failed_predictions_sli_6/

[34] http://darwin-online.org.uk/content/frameset?itemID=F955&viewtype=text&pageseq=1

[35] https://evolution.berkeley.edu/evo-devo/learning-about-evolutionary-history/ (retrieved 14 August 2023)

embryonic facts, which have been raised against and refuted this "Law"[36]. As for the so-called "junk DNA" see footnote for Avise above.[37]

Rather, but I would like to focus here on some groundbreaking statements of one of the greatest European embryologists of the 20th century, Erich Blechschmidt[38], with whom I once discussed this topic at length and subsequently add a recent, in my view, really astounding/thrilling new discovery or perhaps better "non-discovery" of a still assumed and widely touted recapitulation.

First, some comments by Erich Blechschmidt:

> "The application of a "Biogenetic Basic Law" has led to ***many erroneous conclusions, including the assumption of so-called vestigial organs***. Haeckel claimed that many organ formations of the human embryo are nonsensical. However, nonsensical or superfluous organs have actually not been proven in any case. All the organs examined proved to be functional in every phase of development. ***Every cell, every kinetic-anatomically examined cell association and also every organ physiologically examined in the living organism could be proven to be involved in the formative movements of the whole organism***. Every organ examined so far has a formative function. Therefore, the developmental movements may be regarded as a continuous correction [extension] of the preceding processes. This means that developmental movements are the results of earlier achievements, and the achievements of an adult are modified achievements, in particular of the egg and the embryo. Today, we call this sequence of performances functional development.
>
> According to this, it is true that **no organ is an atavistic formation which, like a ruin, would only be of interest as a monument**. Rather, every organ already has a functional meaning during its formation, even if it is by no means a meaning that can simply be understood as useful. Every organ formation is a preliminary design of later performances. Its early functions are elementary functions. We know today, for example, that muscle systems already anticipate the localization of the joints at the time of their formation and thus almost all of their later functions. This happens long before the muscle contractions have anywhere near the force known from adults."
>
> (To repeat from the introductory quotations above) "**This since then so-called "Biogenetic Basic Law" was a catastrophic error in the history of natural sciences**. It has set biology back a full century in theoretical and practical terms. In the theoretical field, through the assumption that a patent solution had already been found with the comparative-anatomical determination of similarities in order to explain developmental processes in general. In the practical field, because it was thought that every formative force and thus the psyche of the human being itself could now simply be understood as a repetition, i.e. as a reproduction" (1968, p. 49; similarly 1977 and 1982).

1982, p. 21, Blechschmidt wrote in his book *Die Erhaltung der Individualität* (Neuhausen - Stuttgart):

> "The phylogenetic interpretation of developmental processes in humans is an ***erroneous attempt to interpret something with short-cuts and thus conveniently dismiss what in truth must be elucidated as ontogenetic differentiation through intensive research activity in humans and also in animals***. The issue in developmental biology is not the similarity of structures, but the reason for this similarity. This is where the scientific problem begins."

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[36] Just a few examples: In http://www.weloennig.de/HumanEvolution.pdf p. 44 with some recent additions:
Concerning concrete answers to the many doubtful examples produced by evolutionary biologists *cf.* for instance the following links:
https://evolutionnews.org/2021/10/so-does-ontogeny-recapitulate-phylogeny-nope/
https://evolutionnews.org/2018/02/bioengineer-asks-what-do-darwinists-hide/
https://evolutionnews.org/2017/12/intelligent-design-and-the-advancement-of-science/
"Design features once assumed to be poorly engineered were later shown to play essential roles. Examples include the backwards wiring of the vertebrate eye, the panda's thumb, and so-called vestigial organs such as the human appendix."
https://evolutionnews.org/2017/09/darwins-point-no-evidence-for-common-ancestry-of-humans-with-monkeys /
https://evolutionnews.org/2017/09/theology-in-biology-class-vestigial-structures-as-evidence-for-evolution/
https://evolutionnews.org/2016/12/lsu_ophthalmolo/
https://evolutionnews.org/2016/06/common_descent /
https://evolutionnews.org/2015/07/people_who_unde/
https://evolutionnews.org/2014/12/5_of_our_top_te/
https://evolutionnews.org/2015/02/problem_10_neo/
https://evolutionnews.org/2010/06/the_recapitulation_myth_still/
See also Reinhard Junker und Siegfried Scherer (eds.) expertly addressing the vestigial-organs-question in their book Evolution – Ein kritisches Lehrbuch pp. 200-226and extensively Reinhard Junker in Ähnlichkeiten, Rudimente, Atavismen (204 pp.)
And last not least Stephen J. Gould (1985): https://www.amazon.de/Ontogeny-Phylogeny-Stephen-Jay-Gould/dp/0674639413
As well as 1981/1996): The Mismeasure of Man https://www.amazon.de/Mismeasure-Man-Stephen-Jay-Gould/dp/0393314251

[37] Moreover, concerning **pseudogenes** *cf.* https://evolutionnews.org/2021/09/pseudogenes-arent-nonfunctional-relics-that-refute-intelligent-design/ https://evolutionnews.org/2020/04/pseudogenes-are-going-the-way-of-darwins-rudimentary-organs/ https://evolutionnews.org/2018/01/adam-and-the-genome-and-nonfunctional-pseudogenes/ and links to a series of articles here: https://www.grisda.org/news?term=pseudogenes&syear=&smonth=&eyear=&emonth=&typesort=

[38] See some comments including footnote on Blechschmidt above. - More on Haeckel's methods here: http://www.weloennig.de/Die_Affaere1.pdf (pp. 85-99)

Regarding the so-called gill systems during embryonic development, the author remarks (1968 p. 50, 51 – *cf*. in French 2017[39]):

> "Today we know that a human egg, fertilized by human semen, ***develops as a human being from the moment of its formation and remains human throughout its life***. For example, the early embryonic facial formation of the human being **does not show gill arches in the sense of typical fish-like formations at any stage**, **and the human germ** [“Keim”/embryo] **also never has a tail in the sense of a differentiation typical of a mouse**. The demonological doctrine of transmigration, that the early facial folds (visceral arches) of man betrayed a fish creature in disguise, is perhaps understandable psychologically, but today it is just as outdated as the superstition that thunder is made by Zeus.
>
> In fact, the bow-shaped thickenings of the head-neck wall (visceral arches) develop as flexural folds in genetically very different embryos. ***They are kinetically, but not genetically, produced in the course of development***: the embryo leans forward; it is said to curve. The supposed embryonic gill arches thereby acquire their respective typical width in a very specific sequence, one after the other, through ingrowing pathways.
>
> They do not have nearly as close a relationship with the so-called gill arches of fish as they do with the tissue from which they arise. Similarly, the gill arches of fish have no demonstrable relationships of embryological interest to organs of other animals, but they too arise from tissues of their own organism. Here, and not in phylogenesis, is the starting point for a more exact and factually testable understanding of the formation of the face.
>
> Of course, the organs of the various living beings - like everything with everything - are comparable, but they nevertheless have no sufficiently close connection that is of interest for the discovery of laws of development. Only the organs of one and the same organism are so closely "related" to each other that scientifically comprehensible relationships can be determined."

So much for some basic comments by embryologist Dr. Erich Blechschmidt (1904-1992)[40], Professor and Director of the Institute of Anatomy, University of Göttingen (1942 – 1973), on the so-called “Biogenetic Law” and “rudimentary organs”. Now – as promised above – let’s briefly turn to ‘a recent, in my view, really astounding/thrilling new discovery or perhaps better “non-discovery” of a still assumed and widely touted recapitulation’.

In the following discussion on kidney development according to modern textbooks of embryology and additional contemporary sources I will first presuppose the existences of the pronephros in its traditional sense.

Kidney Development

In their chapter on the *Embryology of the Kidney*, Rizaldy Paz Scott, Yoshiro Maezawa, Jordan Kreidberg, and Susan E. Quaggin[41] first present a fine introduction into the amazingly manifold functions on the kidney as follows (2019, p. 2):

> “The kidney is a **sophisticated, highly vascularized organ that plays a central role in overall body homeostasis**. In humans, the kidneys filter as much as 180 liters of blood per day, receiving as much as ~20% of the total cardiac output. Renal filtration of blood removes metabolic waste products (e.g., urea, ammonia, and by-products of bile from the liver) as urine **while concomitantly adjusting the levels of water, electrolytes, and pH of tissue fluids**. Additionally, **the kidneys regulate blood pressure** via the renin-angiotensin-aldosterone system, secrete **erythropoietin** that stimulates erythrocyte production, and contribute to the **activation of vitamin D** to control calcium and phosphate balance.”

Followed by an extensive in-depth documentation and discussion of kidney development with many excellent figures and tables and 741 literature references.

My question: ***Could such cases of synorganized multiple functions as shown by the kidney be due by ID?***

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[39] https://www.amazon.fr/Comment-commence-vie-humaine-Observations/dp/2354320620/r

[40] Recall please that (as noted above) ‘the results of Blechschmidt’s research have also been represented by plastic models (named “*Humanembryologischen Dokumentationssammlung Blechschmidt*” being shown at the ZENTRUM ANATOMIE UNIVERSITÄT GÖTTINGEN: https://sammlungen.uni-goettingen.de/sammlung/slg_1000/. This is an **absolutely unique collection publicly accessible at this Centre for Anatomy at Göttingen University**: Each of the 61 models being about 65 to 75 cm high (including “Modellmontage about 180 cm), They show captivating details of development of the human embryo from fertilization to the end of the 8th week of pregnancy.’

[41] In Brenner’s and Rector’s THE KIDNEY https://www.amazon.de/Brenner-Rectors-Kidney-2-Set/dp/0323532659 (“Put the world’s most well-known kidney reference to work in your practice with the 11th Edition of Brenner & Rector’s The Kidney.”)

First another definition of *vestigial* (in the original evolutionary sense of Darwin/Haeckel):

> "Of a body part or organ: remaining in a form that is small or imperfectly developed and **not able to function.**" [42]

Regarding vestigial structures during kidney ontology, the authors are in agreement with almost all contemporary writers of older and recent kidney textbooks as well as scientific and further papers and commentaries that I have checked so far. So, on page 3 the authors note:

> "Mammalian kidneys develop in three successive stages, generating three distinct excretory structures known as the pronephros, the mesonephros, and the metanephros (Fig. 1.2). The ***pronephros and mesonephros are vestigial structures*** in mammals and degenerate before birth; the metanephros is the definitive mammalian kidney."

However, directly after these sentences we read the early stages of kidney development ***are required*** for further developmental processes (pp. 3 and 4):

> "**The early stages** of kidney development **are required** for the development of the adrenal glands and gonads that also form within the urogenital ridge. **Furthermore**, many of the signaling pathways and genes that play important roles in the metanephric kidney appear to play parallel roles during the development of the pronephros and mesonephros."

Nevertheless, as for vestigiality Scott et al. assert again now as part of their explanation for their Fig 1.2:

> "The pronephros and mesonephros **are vestigial structures in mice and humans** and are regressed by the time the metanephros is well developed."

Also, in the Wikipedia (2023)[43] we read on the topic *Pronephros*:

> "The organ is active in adult forms of **some primitive fish, like lampreys or hagfish**. *It is present at the embryo of more advanced fish and at the larval stage of amphibians where it plays an essential role in osmoregulation*. **In human beings, it is rudimentary, appears at the end of the third week (day 20) and replaced by mesonephros after 3.5 weeks.** [44]

Nevertheless, the article continuous:

> "Despite this transient appearance in mammals, ***the pronephros is essential for the development of the adult kidneys***. The duct of the mesonephros forms the Wolffian duct and ureter of the adult kidney. The embryonic kidney and its derivatives also produces the inductive signals that trigger formation of the adult kidney."

So, one may ask whether the pronephros and *mesonephros are really vestigial structures* (in the sense of "an atavistic formation which, like a ruin, would only be of interest as a monument" – or rather, whether they have important functions?

Concerning the pronephros R. P. Scott et al. explain on p. 4:

> "The pronephros consists of pronephric tubules and the pronephric duct (also known as the precursor to the wolffian duct) and develops from the rostral-most region of the urogenital ridge at **22** days of gestation **in humans** and 8 days post coitum (embryonic stage E8) in mice (Table 1.1). … **The pronephros serves as the principal excretory organ of the larval stages of fishes and amphibians**. The mesonephros develops caudal to the pronephric tubules in the midsection of the urogenital ridge. The **mesonephros** becomes the **functional excretory apparatus in lower vertebrates** (**adult fish and amphibians**) and may perform a filtering function during embryonic life in mammals." [45]

Thus, the original evolutionary intention to advance, identify and describe these as vestigial structures in the ontogeny of mammals with special emphasis on humans appears to be clear: **If** the *pronephros* is active only 'in adult forms of some primitive

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[42] https://www.merriam-webster.com/dictionary/vestigial. Or, Oxford Dictionary: of an organ or part of the body) degenerate, rudimentary, or atrophied, **having become functionless in the course of evolution**. (Both definitions retrieved 26 August 2023)

[43] https://en.wikipedia.org/wiki/Pronephros (retrieved 19 August 2023).

[44] See also https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2783241/ Odyssé Michos (2010): Kidney development: from ureteric bud formation to branching morphogenesis. "In amniotes like mammals, **the pronephros is a vestigial structure** rapidly replaced by the mesonephros, which functions during embryonic development."

[45] But then, in contrast to their earlier statements on vestigiality, the authors continue on the mesonephros: "Prior to its degeneration, endothelial, peritubular myoid, and steroidogenic cells from the mesonephros migrate into the adjacent adrenogonadal primordia, which ultimately form the adrenal gland and gonads. **Abnormal mesonephric migration leads to gonadal dysgenesis**, *a fact that underscores* ***the intricate association between these organ systems during development*** and explains the common association of gonadal and renal defects in congenital syndromes." Hence, the mesonephros obviously fulfills important functions.

fish, like lampreys or hagfish', if it is the 'principal excretory organ of the larval stages of fishes and amphibians', and **if** the *mesonephros* becomes the functional excretory apparatus in lower vertebrates (adult fish and amphibians), ***but displays absolutely no biological function in mammals***, or, in other words, **if** *pronephros* and *mesonephros* are '***truly useless rudiments of once-functional systems***', or are ***nothing but atavistic formations like ruins in mammalian ontogeny*** – then they could be viewed as a part of the postulated "180 vestigial structures in the human body, sufficient to make of a man a veritable walking museum of antiquities", ***especially suggesting the descendance and evolution of mammals from 'some primitive fish' over many evolutionary links***.

Or, in the words of Danny Ly of the KenHub Anatomy lectures (2023):

> "**By week 4**, the intermediate mesoderm condenses and reorganizes into a series of epithelial buds. At the cranial level, these buds form the first pair of kidneys, the pronephros (plural, pronephroi). In humans, the pronephros degenerates as rapidly as it forms, **providing a glimpse of evolutionary history** similar to what is observed in the pharyngeal apparatus[46]. In vertebrates with free-swimming larvae, such as teleost fishes and certain amphibians, the pronephros is the functional kidney of their early larval life and is crucial for proper systemic osmoregulation."[47]

In stark contrast to this (and probably as an exception so far), the authors of another modern embryology textbook[48] emphasize that the pronephroi and mesonephroi display some **functional key roles in mammalian ontology**:

Larsen's Human Embryology, 6th Edition 2021, p. 369: "During embryonic development, three sets of nephric systems develop in craniocaudal succession from the intermediate mesoderm. These are called **pronephros**, **mesonephros**, and **metanephros** (or definitive kidneys). Formation of ***the pronephric kidney*** (i.e., pronephros) ***lays the foundation for induction of the metanephros***. Hence, formation of a pronephros ***is really the start of a developmental cascade leading to the formation of the definitive kidney***."

Or, in the 5th edition of 2015: "Although its rapid degeneration in humans, the formation of the pronephros lays the foundation for induction of the mesonephros, which in turn lays the foundation for induction of the metanephros. Hence, ***the pronephros is crucial*** **to the developmental cascade that leads to the formation of the permanent kidneys**."

And in the 4th edition of 2009: "Formation of the pronephric kidney (i.e., pronephros) lays the foundation for the induction of the mesonephric kidney (i.e., mesonephros), and it in turn lays the foundation for the induction of the metanephric kidney (i.e., metanephros). [Again:] **Hence, formation of a pronephric kidney is really the start of a developmental cascade leading to the formation of the definitive kidney**."

Thus, by having vital roles as inducers, the pronephros and mesonephros excel in their being ***crucial to the developmental cascade that leads to the formation of the permanent kidneys***. They are ***definitely not*** 'useless rudiments of once-functional systems'. On this basis ***they are – for sure and unquestionably – not vestigial or atavistic formations comparable to ruins in mammalian ontogeny***.

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[46] Appears to hint at the evolutionary misinterpretations, which E. Blechschmidt has analyzed in detail. Interestingly, for the formation of the pharyngial apparatus ectoderm, mesoderm, and endoderm are synorganized https://en.wikipedia.org/wiki/Pharyngeal_apparatus (26 Aug. 23)

[47] https://www.kenhub.com/en/library/anatomy/development-of-the-urinary-system. Strangely enough, the author continuous – sound in part like a quote from Larsen's Embryolgy: "Although its rapid degeneration in humans, the formation of the pronephros lays the foundation for induction of the mesonephros, which in turn lays the foundation for induction of the metanephros. Hence, the pronephros is crucial to the developmental cascade that leads to the formation of the permanent kidneys."

[48] Gary C. Schoenwolf, Steven B. Bleyl, Philip R. Brauer, Philippa H. Francis-West (2021): Larsen's Human Embryology. Elsevier, Amsterdam. And G.C. Schoenwolf, S.B. Bleyl, P.R. Braeur & P.H. Francis-West: Larsen's Human Embryology, 5th edition, Churchill Livingstone (2015), p. 172-196, 501-523.

However, what about the somewhat 'cunningly' later evolutionary qualifications to save their Darwinian goal that – in the words of Prothero (see above) – "some of these [vestigial structures] have since been shown to have at least a minimal function" (*cf.* also many biological dictionaries and/or encyclopedias including the Wikipedia).

Well, according to the sources cited, pronephros and mesonephros have **really basic** functions, not just "minimal functions" – recall please that "the pronephric kidney (i. e., pronephros) lays **the foundation** for induction of the metanephros", "the pronephros **is crucial** to the developmental cascade that leads to the formation of the permanent kidneys", and that even authors, after having stressed that the **mesonephros** belongs to the category of vestigial structures in mice and humans, subsequently state the following (see above):

> "Prior to its degeneration, **endothelial, peritubular myoid, and steroidogenic cells from the mesonephros migrate into the adjacent adrenogonadal primordia, which ultimately form the adrenal gland and gonads**. ***Abnormal mesonephric migration leads to gonadal dysgenesis***."[49]

And that even the Wikipedia article on the pronephros explains:

> "Despite this transient appearance in mammals, the **pronephros is essential for the development of the adult kidneys**. The duct of the mesonephros forms the Wolffian duct and ureter of the adult kidney. The embryonic kidney and its derivatives **also produce the inductive signals that trigger formation of the adult kidney**."

As an interim result of my studies I would like to emphasize that I have regularly met this contradiction in the literature (scientific or otherwise):

First, most authors are stressing the assumed vestigial nature of the pronephros and mesonephros in mammalian ontogeny, followed by – second – a compelling and powerful enumeration of ***the manifold, crucial, and vital functions of these structures*** for the formation of the metanephros and additional organs.

Now, the "Breaking News"[50] on Kidney Development: *The Pronephros Does Not Even Exist in Mammals*

"A recent detailed analysis of human embryos concluded there is in fact
no pronephric kidney even present in humans, or any mammal,
and they are present and functional only in animals that have an aquatic life phase."[51]

Peter D. Vize (2023)

Evolutionary Biologist

Professor Emeritus. Department of Biological Science, Computer Science and Medicine (University of Calgary, Canada).
First Editor of *The Kidney: From Normal Development to Congenital Disease*. Academic Press 2003.[52]

Surprised? I have to admit I was! After all these contradictory statements documented above on the vestigiality and yet manifold vital functions of the *pronephros* in mammals (not least in man), the "breaking news" that *it does not even exist in mammals* was really unforeseen/astounding/staggering for me.

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[49] See also Maxime Bouchard (2004): Transcriptional control of kidney development. *Differentiation* **72**: 295-306.
P. 295: "In higher vertebrates **the pronephros is not functional**, whereas structural data suggest that the mesonephros has excretory functions in human and pig but not in the mouse (Saxen, 1987). Together, **the pro/mesonephros, however, serves a central function** by acting successively as the site of nephric lineage specification, the foundation of the metanephric kidney, and later becomes an integral part of the male genital apparatus (epididymis, vas deferens, seminal vesicles)." And in the Introduction: "The mammalian kidney develops in three successive phases: the pronephros, the mesonephros, and the metanephros (adult kidney; Fig. 1A). **Each of these embryonic kidneys lays the foundation for the induction of the following one**, so that **kidney organogenesis really starts with pronephros induction** and progresses stepwise until completion of adult metanephros development soon after birth."

[50] This is, of course, not a "Breaking News" in the sense known as "a special report or special coverage or news flash, is a current issue that broadcasters feel warrants the interruption of scheduled programming or current news in order to report its details" (Wiki). Yet, for many researchers it may news ***breaking*** an important but false evolutionary hypothesis.

[51] P. D. Vize (2023): A beautiful, complex simplicity: the origins of nephron segmentation uncovered by single-cell sequencing of the pronephros. *Kidney International* **103**, 23–25.

[52] https://www.amazon.de/-/en/Peter-D-Vize/dp/0127224416 . Publications: 126: https://www.researchgate.net/scientific-contributions/Peter-D-Vize-38118376
One may also have a look at this: https://www.vizelab.com/publications.html
https://www.xenbase.org/xenbase/community/person.do?method=display&personId=702

Nevertheless, this was also the answer to my question why – despite my intense literature research work – I could not find anything on the *pronephros* by Erich Blechschmidt (see above), one of the best European human embryologists of his time (perhaps even the best) who had decidedly criticized and disproved Haeckel's "Biogenetic Law". So, Blechschmidt evidently never ever detected it because it simply did not exist.

My quotation of Peter D. Vize's the text above now in its context (2023, p. 23):

> "For many students first learning about development of the kidney, the clearest memories are often a jumbled set of anatomical terms that do not make much sense. The pronephros, mesonephros, metanephros, and a suite of terms for tubule-like components and spaces, like nephrocoel, peritoneal funnels, and nephrostomes, tended to be confusing and difficult to relate to the well-understood anatomy of the adult kidney - conveniently missing many of these mysterious anatomical features. **In fact, a recent detailed analysis of human embryos concluded there is in fact no pronephric kidney even present in humans, or any mammal, and they are present and functional only in animals that have an aquatic life phase**. It is not surprising that pronephroi are most intensely studied in model organisms like *Xenopus* (an amphibian) and *Danio* (the zebrafish). In these animals, the pronephric kidney is a single nephron and, before coiling phases, is laid out in a flat 2-dimensional manner, much like the illustrations used in textbooks to depict mammalian nephron anatomy."

Now, let's turn to the original paper of the evolutionary biologists B. S. de Bakker, M. J. B. van den Hoff, P. D. Vize and R. J. Oostra (2019): *The Pronephros; a Fresh Perspective*[53] the authors present the following Synopsis for their detailed article (p. 29):

> "**Synopsis** Contemporary papers and book chapters on nephrology open with the assumption that human kidney development passes through three morphological stages: pronephros, mesonephros, and metanephros. Current knowledge of the human pronephros, however, **appears to be based on only a hand full of human specimens**. **The ongoing use of variations in the definition of a pronephros hampers the interpretation of study results**. Because of the increased interest in the anamniote pronephros as a genetic model for kidney organogenesis we aimed to provide an overview of the literature concerning kidney development and to clarify the existence of a pronephros in human embryos. We performed an extensive literature survey regarding vertebrate renal morphology and ***we investigated histological sections of human embryos between 2 and 8 weeks of development***. To facilitate better understanding of the literature about kidney development, a referenced glossary with short definitions was composed. The most striking difference between pronephros versus meso- and metanephros is found in nephron architecture. ***The pronephros consists exclusively of nonintegrated nephrons with external glomeruli, whereas meso- and metanephros are composed of integrated nephrons with internal glomeruli***. Animals whose embryos have comparatively little yolk at their disposal and hence have a free-swimming larval stage do develop a pronephros that is dedicated to survival in aquatic environments. Species in which embryos do not have a free-swimming larval stage have embryos that are supplied with a large amount of yolk or that develop within the body of the parent. In those species the pronephros is usually absent, incompletely developed, and apparently functionless[54]. **Non-integrated nephrons were not identified in histological sections of human embryos**. Therefore, we conclude that ***a true pronephros is not detectable in human embryos*** although the most cranial part of the amniote excretory organ is often confusingly referred to as pronephros. The term pronephros should be avoided in amniotes unless all elements for a functional pronephros are undeniably present."

Among other points, they raise the following question in their introduction (p. 29):

> "A kidney-related article or book chapter commonly starts with: "Human kidney development follows three separate stages: pronephros, mesonephros, and metanephros (Fig. 1A)" [References from 1917 to 2015: see footnote[55]] **Is this actually true? *How sure are we that human embryos pass through a pronephric phase?***

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[53] B. S. de Bakker, M. J. B. van den Hoff, P. D. Vize and R. J. Oostra (2019): The Pronephros; a Fresh Perspective. Integrative and Comparative Biology 59: 29–47. Note please also the following statement (p. 29, footnote): "This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons. org/licenses/by-nc/4.0/), **which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited**." All **highlighting/emphasis in the typeface** by W.-E. L. (except italics for ***genera*** and ***species*** names).

[54] So, despite the qualifying "apparently", I would like to repeat my question: **Why is it still there if *natural selection "is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good*"**? (Darwin) And according to Haekel (1866, p. 268) the "rudimental organs" are often even "**nachteilig und schädlich**" And before that (p. 267) he speaks of the "rudimental organs", " welche entweder ganz gleichgültig und unnütz, **oder sogar entschieden „unzweckmässig**" sind." (Generelle Morphologie der Organismen).

[55] Prentiss and Arey 1917; Bailey and Miller 1921; McCrory 1974; Patten and Carlson 1974; Tuchmann-Duplessis and Haegel 1974; Moore 1988; Vize et al. 1997; Kuure et al. 2000; Cochard 2002; Pole et al. 2002; Hiruma and Nakamura 2003; Ryffel 2003; Nishinakamura 2003; Sadler 2004; Solhaug et al. 2004; Carev et al.

> Doubt on the existence of this structure might be inferred from **its vague connotation as "transient," "vestigial"** (Goodrich 1930), **"nonfunctional," or "aglomerular"** (Goodrich 1930; Fraser 1950; Hamilton et al. 1972; Solhaug et al. 2004). Until the 1950s the pronephros, referred to as the first and most primitive embryonic kidney, was actively studied in various species and it recently regained attention because of the establishment of zebrafish and *Xenopus laevis* as vertebrate models to study human urogenital development. **These species display a transient but functional pronephros at some stage of their embryonic development** (Vize et al. 1997; Kuure et al. 2000; Drummond 2005; Jones 2005; Raciti et al. 2008; Wessely and Tran 2011)."

And B. S. de Bakker et al. report under the subheading *Background The pronephros; prone to confusion and inconclusiveness* as follows (p. 30/31):

> "Although **the presence of a pronephros in human embryos was already questioned by Fraser in 1950** (Fraser 1950), **it remains unsettled whether amniotes, mammals, or humans actually do possess a pronephros in the embryonic stage**. This is mainly due to *confusing terminology and definitions*. For example, the nephrocoel (Kerr 1919; Goodrich 1930), a fluid filled cavity in which the external glomerulus or glomus of the pronephros protrudes, was also referred to as pronephric cavity (Vize et al. 1997), glomerular space (Vize et al. 1997), pronephric chamber (Goodrich 1930; Huettner 1968), nephric chamber (Fraser 1950), or coelomic chamber (Fraser 1950; Davies 1951), *depending on the source, era, and background of the author*. Even more confusing is the fact that sometimes one term is used for two different structures."

Followed by examples. For many details on *the non-integrated nephron of a pronephros in frogs* and *the integrated nephrons of a mesonephros*, the *detailed architecture of a pronephric and a mesonephric nephron* as well as the corresponding figures with extensive texts, I have to refer the reader to the original article.

On pp. 33/34 de Bakker et al. go on discussing the question *Pronephros in human embryos*? as follows:

> "Existence of a pronephros has often been claimed in human embryos [the many references see below[56]] and nowadays still many kidney-related articles or book chapters open with the assumption that human kidney development passes through all three kidney stages. ***In an era in which study designs were based on the theory that ontogeny recapitulates phylogeny*** (Smith 1953; Huettner 1968; Hiruma and Nakamura 2003; Solhaug et al. 2004), ***it could be condoned that the findings of studies on fish and amphibians were projected onto the early stages of human development***. **According to this refuted theory, the most cranial region of the human mesonephros might have been named "pronephric"** (Davies 1950; Fraser 1950). Note also that research on human embryos has always been hampered by their scarcity. *Therefore, recent literature is almost always directly or indirectly referring to the extensive study of the human pronephros by Felix in 1912* (Felix 1912)."

The authors continue on the history of the previous studies:

> "Since 1912, ***not many researchers specifically studied the human pronephros***. Most textbooks are referring to Lauri Saxen's "Organogenesis of the Kidney" (1987). In the corresponding chapter the author quotes another kidney scientist, Torrey, as his prime source for information on the pronephros, but it turns out that ***Torrey did not claim at all that human embryos have a pronephros*** (Torrey 1954; O'Rahilly and Muller 1987). As it appears, the current knowledge of the human pronephros is very limited, since it is based on only a hand full of observations. Already in 2004, Solhaug et al. (2004) stressed the need for studies in human samples. Therefore, we decided to investigate the development of the nephric system in the specimens of human embryos that were available to us."

For the detailed *Materials and methods* and *Research method* with extensive Table 1 ("Overview of the studied human specimens"), see please again the original paper. Just to mention a key point concerning the *Specimens*: "Images of serial histological sections of 43 human embryos from Carnegie stage 8 (17–19 days) till 23 (56–60 days) from the Carnegie Collection in Silver Spring, MD, USA, were used to study kidney

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2006; Raciti et al. 2008; Michos 2009; Wessely and Tran 2011; Gerlach and Wingert 2013; Marra and Wingert 2014; Upadhyay and Silverstein 2014; Xing et al. 2014; Hohenstein et al. 2015; Wang and Li 2015.

[56] "Felix 1912; Prentiss and Arey 1917; Fraser 1920; Bailey and Miller 1921; Hoadley 1926; Keith 1933; Abdel-Malek 1950; Hamilton 1952; Torrey 1954; Hamilton et al. 1972; McCrory 1974; Tuchmann-Duplessis and Haegel 1974; Gasser 1975; Moore 1988; Kuure et al. 2000; Hiruma and Nakamura 2003; Sadler 2004, 2015; Solhaug et al. 2004; Carev et al. 2006; Gilbert 2010; Cochard 2012."

development." Moreover, "All readers are encouraged to study the histological sections of all studied stages by downloading them from our website, http://www.3datlasofhumanembryology.com".

In agreement with the research of comparative embryologist Elizabeth A. Frazer ("The term pronephros should ***only be applied to the organ in larval Anamnia and to that of a few adult teleosts***"[57]) and the human embryologist Erich Blechschmidt (who, although focusing his extensive research especially on the first weeks of human embryology, ***did not mention a pronephros at all***[58]) as well as Theodore W. Torrey[59] ("*It is judged that in the human embryo, as in other eutherian mammals,* ***the pronephros actually does not exist****, and that support is thus given to the general concept that the pronephros has reality only in anamniotes with larval stages*"[60]), – the authors B. S. de Bakker, M. J. B. van den Hoff, P. D. Vize and R. J. Oostra summed up the main point of their investigations as follows (p. 43): "The pronephros proper consists of nonintegrated nephrons, whereas the mesonephros and metanephros consist of only integrated nephrons. ***We observed that the pronephros as such is not detectable in human embryos***."

Concerning the *Evolutionary aspects of kidney development* (in different vertebrate taxa) by de Bakker et al., I would like to discuss this topic at length in another article.

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P. S. (8 September 2023): One may ask why such a mistake – seeing a pronephros where there was none – was possible at all.

A part of the answer has already been given above, to repeat:

> "In an era in which study designs were based on the theory that ontogeny recapitulates phylogeny (Smith 1953; Huettner 1968; Hiruma and Nakamura 2003; Solhaug et al. 2004), it could be condoned that the findings of studies on fish and amphibians were projected onto the early stages of human development. According to this refuted theory, the most cranial region of the human mesonephros might have been named "pronephric".

Moreover, considering the small dimensions (just a few mm) of the human embryo on the 22nd day of gestation[61] (given as the start of kidney development) to the construction of the metanephoi at 5 weeks gestational age[62] – what does the embryo look like? "Young eggs and embryos are crystal clear-transparent and seemingly structureless due to their high water content. Therefore, very special examination methods are necessary" (embryologist Erich Blechschmidt[63]).

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[57] https://journals.scholarsportal.info/details/14647931/v25i0002/159_tdotves.xml

[58] As far as I could detect after intensive studies of his works.

[59] Theodore W. Torrey, 1907-1986, was a Professor in the Zoology Department at Indiana University from 1932 until his retirement in 1972. https://webapp1.dlib.indiana.edu/findingaids/view?doc.view=entire_text&docId=InU-Ar-VAA2669

[60] https://eurekamag.com/research/025/735/025735884.php Torrey, T.W. The early development of the human nephros. Contr Embryol Carnegie Inst Washington 35: 175-197

[61] "Formation of the three primary germ layers occurs during the third week of development. The embryo at this stage **is only a few millimetres in length**. https://teachmeanatomy.info/the-basics/embryology/gastrulation/ *Cf.* more https://www.kenhub.com/en/library/anatomy/embryology-3rd-week-of-development "An embryo at the end of **7 weeks of development is only 10 mm in length**,…" https://courses.lumenlearning.com/suny-ap2/chapter/embryonic-development/ "In the **fourth week** the embryo goes beyond the external characteristics of vertebrates in general and becomes recognizable as a mammal. The week is marked by profound changes during which the embryo acquires its general body plan. **There is an increase in total length from about 2 to 5 mm** (about 0.08 to 0.2 inch), but size is quite variable among smaller specimens." https://www.britannica.com/science/prenatal-development/Embryonic-acquisition-of-external-form See especially also: https://www.3dembryoatlas.com/

[62] "Human kidney development begins **at week 3 of embryonic development** with the formation of the pronephros [sic!], which regresses and is followed by formation of **the mesonephros at 4 weeks and the metanephros at 5 weeks gestational age**." Dina Greenberg, Robert D'Cruz, Jon L. Lacanlale, Christopher J. Rowan, Norman D. Rosenblum (2023): Hedgehog-GLI mediated control of renal formation and malformation. Front. Nephrol. Sec. Glomerular disease Volume 3: https://www.frontiersin.org/articles/10.3389/fneph.2023.1176347/full

[63] Original German Text: „Junge Eier und Embryonen sind glasklar-durchsichtig und wegen ihres hohen Wassergehalts scheinbar strukturlos. Deshalb sind sehr spezielle Untersuchungsmethoden notwendig (Blechschmidt 1968, p. 20: Vom Ei zum Embryo).

As for the mesonephros: does the developmental stage when the mesonephroi appear in human embryology (at ca. 4 weeks) demand all the same activities and tasks as the later stages? Would the later appearing adult kidneys with the entire set of all their multiple structures and functions not be out of place during this developmental phase?

Recall please:

> "Every cell, every kinetic-anatomically examined cell association and also every organ physiologically examined in the living organism could be proven to be involved in the formative movements of the whole organism. Every organ examined so far has a formative function. Therefore, the developmental movements may be regarded as a continuous correction [extension] of the preceding processes. This means that developmental movements are the results of earlier achievements, and the achievements of an adult are modified achievements, in particular of the egg and the embryo. Today, we call this sequence of performances functional development.
>
> According to this, it is true that ***no organ is an atavistic formation which, like a ruin, would only be of interest as a monument***.".

As far as I can understand it, the mesonephroi appear to be the optimal solution for the physiological and genetical tasks during this embryological stage of human development.

So, also these phenomena are in full harmony with the ID theory

Supplement

Einige Hinweise zu Blechschmidt und Zitate aus seinen Arbeiten im Original sowie zu Wiedersheim (unten)

Die Frühentwicklung des Menschen: Eine Einführung Broschiert – 1. September 2011
von Erich Blechschmidt (Autor)

Über den Autor und weitere Mitwirkende:

Prof. Dr. med. Blechschmidt war von 1942–1973 Direktor des Anatomischen Instituts der Universität Göttingen. Sein Forschungsgebiet war die Humanembryologie, vor allem die Morphogenese der frühen vorgeburtlichen Stadien des Menschen. Um die Lage-, Form- und Strukturveränderungen der Embryonen zu zeigen, ließ er Kunststoffmodelle herstellen, die die heute nach ihm benannte „Humanembryologische Dokumentationssammlung Blechschmidt" bilden. Die Sammlung ist im Anatomischen Institut der Universität Göttingen auch der Öffentlichkeit zugänglich. Blechschmidt widerlegte auf Grund seiner Forschungen das von Ernst Haeckel aufgestellte Biogenetische Grundgesetz, nach dem die Entwicklung des menschlichen Embryos die stammesgeschichtliche Entwicklung nachvollziehe (Haeckel: Die Ontogenese rekapituliert die Phylogenese). Vielmehr ist der menschliche Embryo von der Befruchtung an individualspezifisch menschlich und die Änderungen

seines Erscheinungsbildes können im Sinne einer Gestaltungs-Anatomie als Folge kinetischer und dynamischer Merkmale beschrieben werden. Die von Blechschmidt gefundenen Regeln und Prinzipien der Entwicklung sind auch für das Verständnis der Physiologie und für die Therapie von Bedeutung.
https://www.amazon.de/Die-Fr%C3%BChentwicklung-Menschen-Eine-Einf%C3%BChrung/dp/3943324001

Originalzitate Blechschmidt (aus meiner Mail an Herrn X vom 15. Juli 2023):

Prof. Dr. Erich Blechschmidt (1904 – 1992). Zu seinem Buch *Ontogenese des Menschen: Kinetische Anatomie* Gebundene Ausgabe, neu aufgelegt am 21. März 2022, schreiben die Herausgeber:

„Dieses Buch gibt einen Überblick über die Form- und Strukturveränderungen des menschlichen Körpers von der Befruchtung bis zum Embryo: die damit einhergehende Entstehung der Organe, deren fortschreitende Veränderungen von Form und Lage und daraus folgend die Entstehung neuer Gewebeformen. Die Forschungsergebnisse des Embryologen Erich Blechschmidt weichen grundlegend von den Standards einer deskriptiven und funktionellen, mikrobiologisch orientierten Embryologie ab. ***Sie bringen Aspekte und Fakten zum Thema Evolution und Lebensbewertung, die heute im Rahmen der Gentechnik, des Klonens, der pränatalen Diagnostik und der Stammzellenforschung neu betrachtet werden. Mit diesem Buch wird der ontogenetisch-biodynamische Ansatz von Blechschmidt wieder zugänglich gemacht.*** Diese Ausgabe ist inhaltlich unverändert.“

Sein Buch *Die Frühentwicklung des Menschen* ist im September 2011 noch einmal neu publiziert worden. Ebenso eine Schriftensammlung zum Thema *Gesicht, Kopf, Nervensystem*: *Schriftensammlung Erich Blechschmidt*, im Februar 2015, auch mehrere seiner Bücher auf Englisch.

Die Neuauflagen seiner Bücher auf Deutsch und Englisch zeigen bereits, dass die Ergebnisse seiner embryologischen Forschung heutzutage aktueller denn je sind.

Im Biologieunterricht an Schulen und Universitäten wird immer noch das „Biogenetische Grundgesetz“ in abgewandelter Form als Beweis für die Abstammung des Menschen aus dem Tierreich und allgemein als Bestätigung der darwinistischen Evolutionslehre gelehrt. Dazu schreibt Blechschmidt unter anderem in seinem Buch *Vom Ei zum Embryo* (Deutsche Verlags-Anstalt Stuttgart, 1968, S. 57):

„Die Anwendung eines „Biogenetischen Grundgesetzes“ hat zu vielen Fehlschlüssen geführt, u.a. auch zu der Annahme sogenannter rudimentärer Organe. Haeckel behauptete, viele Organbildungen des menschlichen Embryos seien unsinnig. ***Doch sind unsinnige oder überflüssige Organe tatsächlich in keinem Fall nachgewiesen worden***. Alle untersuchten Organe erwiesen sich in jeder Entwicklungsphase in Funktion. Dabei ließen sich jede Zelle, jeder kinetisch-anatomisch untersuchte Zellverband und auch jedes außerdem noch

physiologisch im lebenden Organismus untersuchte Organ als mitbeteiligt an den Gestaltungsbewegungen des ganzen Organismus nachweisen. ***Jedes bisher untersuchte Organ hat Gestaltungsfunktion***. Deshalb dürfen die Entwicklungsbewegungen gleichsam als eine fortgesetzte Korrektur [Erweiterung] der vorangegangenen Vorgänge angesehen werden. Das besagt: Entwicklungsbewegungen sind Resultate früher Leistungen, und die Leistungen eines Erwachsenen sind abgewandelte Leistungen im Besonderen des Eis und des Embryos. Diese Leistungsfolge nennen wir heute Funktionsentwicklung.

Danach gilt, dass kein Organ eine atavistische Bildung ist, die etwa ähnlich wie eine Ruine nur noch als Denkmal von Interesse wäre. **Vielmehr hat jedes Organ schon während seiner Entstehung eine funktionelle, wenn auch keineswegs eine einfach als nützlich zu verstehende Bedeutung**. Jede Organbildung ist ein Vorentwurf späterer Leistungen. Seine Frühfunktion sind Elementarfunktionen. So wissen wir heute zum Beispiel von Muskielanlagen, dass sie schon zur Zeit ihrer Entstehung die Lokalisation der Gelenke und damit schon fast ihre ganze spätere Funktionsweise vorwegnehmen. Dies geschieht, längst bevor die Muskelkontraktionen nur annähernd die vom Erwachsenen bekannte Kraft haben.“

Die folgenden Sätze hatte ich Ihnen schon in einer früheren Mail zitiert. Da diese Aussagen von fundamentaler Wichtigkeit sind, wiederhole ich sie im Folgenden kurz:

"Dieses seither sogenannte "Biogenetische Grundgesetz" war ein katastrophaler Irrtum in der Geschichte der Naturwissenschaften. Er hat die Biologie um ein volles Jahrhundert in theoretischer und praktischer Hinsicht zurückgeworfen. Auf theoretischem Gebiet durch die Annahme, dass mit der vergleichend-anatomischen Feststellung von Ähnlichkeiten bereits eine Patentlösung gefunden sei, um generell Entwicklungsvorgänge zu erklären. Auf praktischem Gebiet, weil man meinte, nunmehr überhaupt jede Gestaltungskraft und damit die Psyche des Menschen selbst einfach als eine Wiederholung, d.h. als Reproduktion, auffassen zu dürfen." (1968, p. 49; ähnlich 1977 und 1982).

Im Jahre 1982, Seite 21, schrieb Blechschmidt in seinem Buch *Die Erhaltung der Individualität* (Neuhausen – Stuttgart):

"***Die phylogenetische Deutung von Entwicklungsprozessen beim Menschen ist ein irriger Versuch, mit Kurzschlüssen etwas zu deuten und so auf bequeme Weise abzutun, was in Wahrheit durch intensive Forschungstätigkeit beim Menschen und auch beim Tier als ontogenetische Differenzierung aufgeklärt werden muss***. Das Thema in der Entwicklungsbiologie ist nicht die Ähnlichkeit von Strukturen, sondern der Grund dieser Ähnlichkeit. Hier beginnt das naturwissenschaftliche Problem."

Zu den sogenannten **Kiemenanlagen** während der embryonalen Entwicklung bemerkt der Autor (1968 S. 50, 51):

„Heute wissen wir, dass ein menschliches Ei, vom menschlichen Samen befruchte, sich seit seiner Entstehung als Mensch entwickelt und auch während seines ganzen Lebens menschlich bleibt. ***So zeigt zum Beispiel die frühembryonale Gesichtsbildung des Menschen in keinem Stadium Kiemenbögen im Sinne typisch fischartiger Bildungen, und der menschliche Keim hat auch niemals einen Schwanz im Sinne einer mäusetypischen Differenzierung***. Die dämonologische Seelenwanderungslehre, die frühen Gesichtsfalten (Visceralbögen) des Menschen verrieten ein verkapptes Fischwesen, **ist zwar psychologisch vielleicht verständlich, heute aber ebenso überholt wie jener Aberglaube, dass der Donner von Zeus gemacht werde**.

Tatsächlich entstehen die bogenförmigen Verdickungen der Kopf-Hals-Wand (Visceralbögen) als Beugefalten bei genetisch sehr verschiedenen Embryonen. **Sie sind kinetisch, aber nicht genetisch im Verlauf der Entwicklung hervorgebracht**: der Embryo neigt sich vornüber; man sagt, er krümmt sich. Die vermeintlichen embryonalen Kiemenbögen erhalten dabei in einer ganz bestimmten Reihenfolge nacheinander durch einwachsende Leitungsbahnen ihre jeweils typische Breite. Zu den sogenannten Kiemenanlagen von Fischen haben sie nicht annähernd so enge Beziehungen wie zu dem Gewebe, aus dem sie entstehen. Ebenso weisen die Kiemenbögen von Fischen keine nachweisbaren, embryologisch interessierenden Beziehungen zu Organen anderer Tiere auf, sondern auch sie gehen aus Geweben ihres eigenen Organismus hervor. Hier und nicht in der Phylogenese ist der Ansatz für ein exakteres und sachlich im Einzelnen prüfbares Verständnis der Gesichtsbildung gegeben.

Selbstverständlich sind die Organe der verschiedenen Lebewesen – wie alles mit allem – vergleichbar, aber sie haben trotzdem keinen für die Auffindung von Entwicklungsgesetzen interessierenden, hinreichend engen Zusammenhang. Nur die Organe ein und desselben Organismus sind so nahe miteinander „verwandt“, dass naturwissenschaftlich fassbare Beziehungen ermittelt werden können.“

Soweit hier in dieser Mail die Bemerkungen von Prof. Erich Blechschmidt zum „Biogenetischen Grundgesetz“ und den „rudimentären Organen“

Zu Wiedersheim:

Incidendally, in 1887 Robert Wiedersheim, professor of anatomy at the Albert Ludwigs University of Freiburg, enumerated 86 rudimentary organs in humans in the first edition of his book *Der Bau des Menschen als Zeugnis für seine Vergangenheit*, but in the following editions (1893 and 1902) a hundred or so more – assuming and discussing in the last edition of his book (pp. 223-228) some

180 to 222 such structures and organs in man hypothetically derived from animals down to the sharks, most of which he thought now to be “wholly or in part functionless” – among them such vital organs like the hypophysis (p. 226), the thyroid gland (p. 182), the adrenal gland (pp. 216/228) – in fact, almost the entire system of internal/ductless secretory glands were addressed by him under the topic of vestigial organs and rudimentation (“als Zeugnis für seine Vergangenheit”) – also many other systems and organs of which the vital functions were fully discovered only later on. On the whole, during the last more than 130 years, **virtually none of the 86 to 222 candidates has been exactly established to be definitely rudimentary by any rigorous scientific criteria, definitions and investigations**.31 On the contrary, in the wake of further painstakingly precise scientific research, the number of rudimentary organs has steadily declined so that at present there are hardly any serious candidates left.

[Wiederholung jetzt auf Deutsch]
http://www.weloennig.de/HumanEvolution.pdf

"Übrigens zählte Robert Wiedersheim, Professor für Anatomie an der Albert-Ludwigs-Universität Freiburg, 1887 in der ersten Auflage seines Buches *Der Bau des Menschen als Zeugnis für seine Vergangenheit* 86 rudimentäre Organe beim Menschen auf, in den folgenden Auflagen (1893 und 1902) aber etwa hundert mehr - wobei er in der letzten Auflage seines Buches (S. 223-228) etwa 180 bis 222 solcher Strukturen und Organe beim Menschen, die er hypothetisch von Tieren bis hinunter zu den Haien ableitet, von denen er die meisten nun für "ganz oder teilweise funktionslos " hält - ***darunter so lebenswichtige Organe wie die Hypophyse*** (S. 226), ***die Schilddrüse*** (S. 182), ***die Nebennieren*** (S. 216/228) - in der Tat wurde fast das gesamte System der inneren/kanallosen Sekretionsdrüsen von ihm unter dem Thema der rudimentären Organe und der Rudimentierung ("als Zeugnis für seine Vergangenheit") behandelt - auch *viele andere Systeme und Organe, deren lebenswichtige Funktionen erst später vollständig entdeckt wurden*. Insgesamt ist in den letzten mehr als 130 Jahren praktisch ***keiner der 86 bis 222 Kandidaten nach strengen wissenschaftlichen Kriterien, Definitionen und Untersuchungen als definitiv rudimentär nachgewiesen worden***. Im Gegenteil, im Zuge weiterer akribisch genauer wissenschaftlicher Untersuchungen hat sich die Zahl der rudimentären Organe stetig verringert, so dass es heute kaum noch ernsthafte Kandidaten gibt.“

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