

*Kant's wager. Kant's strong belief in extra-terrestrial life, the history of this question and its challenge for theology today*¹

For many, it does not seem very grounded to think about possible life beyond our planet. This is especially true for continental theologians, who favour to develop their theology independently of the findings of science (Daecke 1987, 32; Losch 2011, 14 f.), leaving the issue of science to the scientists. But is this always a good stance in an age of science? Although such an “independence model” (Barbour 1997, 84-89) certainly presents a more healthy approach for theology than the idiocies of creationism, it could also result in an outdated imagination of the current status of scientific findings, which could, in turn, influence the implicit scientific assumptions of modern theologies in an anachronistic way. In this paper will be shown that this could be particularly true for the issue of the potential existence of extra-terrestrial life.

The philosophy of Immanuel Kant is still very influential in continental theology, as he is regarded as a most critical and sober thinker, and it is therefore highly interesting how he regarded the probability of such a speculative topic as the existence of extra-terrestrial life. For those untrained in the history of the extra-terrestrial life debate, the results may be most surprising. Kant was not the first in whom the “starry heavens” above us inspired awe and wonder (Kant 1999, 133 (5:161)) Yet Kant was also firmly convinced of the existence of inhabitants of other worlds, so these heavens were inhabited for him.² Kant even asserts provocatively that it is typical of people who are ruled by *self-interest* not to embark on a voyage of discovery into the expanse of the fixed stars, but to want to wait “until people have agreed on the most advantageous way to drive the plow” (Kant 2011, 38 (2:226)). He is certain that “If it were possible to settle by any sort of experience whether there are

¹ The article appeared in German first, in the journal *Theologische Zeitschrift* 1/71 (2015), pp. 23-47.

² “Likewise they do not need to know more of the cosmos than is necessary to make the view of heavens on a beautiful evening moving for them if they have somehow understood that there are to be found still more worlds and in them still more beautiful creatures.” Kant 2011, 42 (2:231). Kant is referring here to women, according them, however, a dubious honour, see Wille 2005, 51 ff. On the habitation of the “starry heavens” compare also Crowe 1999, 55 f. and Crowe/Dowd 2013, 4, 53 f.

inhabitants of at least some of the planets that we see, I might well bet everything that I have on it. Hence I say that it is not merely an opinion but a strong belief (on the correctness of which I would wager many advantages in life) that there are also inhabitants of other worlds.” (Kant 1998, 687 (B 853)) This statement by Kant in no less a work than the *Critique of Pure Reason* ought to make us reflective in considering the subject of extra-terrestrial life.

On the one hand we can see in this statement a reflection of Kant's earlier convictions and expositions, on the other hand the context of the *Critique of Pure Reason* is, of course, relevant. Kant alludes to aliens “repeatedly at quite central points in his thinking, and this applies throughout his productive years” (Wille 2005, 11f.). Kant also dwelled in the topic even in his last years (Szendy 2013, 45ff). Following his example, this paper will therefore investigate the meaning of reflections of this kind, which due to advances in planetary astronomy are today again on the agenda. In Kant’s time, theology was a discipline everyone more or less had to deal with, and this is reflected in Kant’s writings. The question arises whether consideration of this subject finally also represents a challenge for modern theological thought. We will see that this is indeed the case, as has also been recognised in the history of addressing this subject. At the end of this paper, we will therefore outline some basic scenarios regarding the existence of extra-terrestrial life and their impact for theology. We will start, however, with Kant’s attitude to these regards and then will turn to the history of thought regarding extra-terrestrial life, before coming back to theology proper.

I. Kant's reflections in Universal Natural History and Theory of the Heavens

The trail of Kant's occupation with the subject leads us first of all back to his *Universal Natural History and Theory of the Heavens*. Until the 1760s, Kant's works were dominated by general problems relating to the natural sciences (Krafft 1971, 179, 179 f.), and this early work, published in 1755,³ is also dedicated to this subject area. It is astonishing how many later astronomical insights Kant anticipated in this work,⁴ given that the empirical basis at the

³ However, a large proportion of the edition was destroyed in a fire, so that Johann Friedrich Gensichen put together for Kant in 1781 a brief extract from the main comments and published them as an appendix to a German translation of F.W. Herschel (Krafft 1971, 192 ff.).

⁴ Compare Krafft 1971, 188 f. and Kurth 1956, 57.

time of writing was extremely weak (Krafft 1971, 180 f.).⁵ It should not be forgotten that the specific subject to which Kant devotes himself, “scientific” cosmogony, was a relative novelty.⁶ In this Kant's expositions also differ from the purely cosmological observations of Thomas Wright (Wright 1971), by which Kant was inspired, but which he knew only from a review.⁷ With the design of a cosmogony the term “historia naturalis” was redefined by Kant, and it was he who “first conceived of the entirety of world events as historical” (Krafft 1971, 180f.).

Kant also differs from the other great thinkers of the modern age, who were scientists as much as they were philosophers, in that he “cannot be counted among the great mathematicians” (Krafft 1971, 179f.), and may not even have fully mastered the Newtonian physics of his time.⁸ In those days this was apparently not yet significant in “astronomy”; the process of analogy (drawing conclusions from the known to the unknown) had to fill many gaps (Krafft 1971, 181f.). Kant’s theory of the heavens is a type of “qualitative” physics – certainly also applying some quantitative calculations – a surprisingly large proportion of which proved well-founded,⁹ and later even became “a direct starting-point for modern cosmogony” (Hamel 2005, 204 f.). Thirty years after the initial publication, it was the astronomer William Herschel who formed views about milky ways and nebulae which broadly overlapped with Kant’s identification of the latter with clusters of stars (Kurth 1956, 58 f.). “Independently of Kant, forty years after the latter’s *General Natural History*, Laplace formulated a similar hypothesis about the formation of the solar system from a rotating nebula. His theory made a

⁵ Also Jones 1971, 29.

⁶ Jürgen Hamel, however, refers to the cosmogonic hypotheses of George Louis Leclerc de Buffon, to which Kant also explicitly refers (Hamel 2005, 147, 151 ff.).

⁷ Freie Urtheile und Nachrichten zum Aufnehmen der Wissenschaften und Historie überhaupt, Hamburg, bey Georg Christian Grund. 1751, in: Krafft 1971, 199-211 and Kant 2012, 201 (1:231), 202 (1:232), 215ff (1:248).

⁸ Very critical in this regard is Jaki 1977, 111 ff. However, one must also investigate what knowledge of Newtonian mechanics could in fact have been accessible to Kant in Königsberg in his day, cf. Waschkies 1987, 4 ff.

⁹ See Note 3.

bigger impact than Kant's early work, which was then, however, re-discovered and became known to a wider public. The combination of both drafts to form the Kant-Laplace theory then dominated the cosmology of the 19th century." (Evers 2000, 75 ff.)¹⁰

At this time, before Laplace's famous pronouncement that he no longer needed the hypothesis of God,¹¹ theology and astronomy were often intertwined. Newton had averted the possible atheistic consequences of his laws of gravity to the extent that, in his letters to Bentley, he postulated a divine hand which held the planets on course against the gravitational pull of the sun despite frictional loss (Dick 1982, 145 f.).¹² And Thomas Wright assumed that the Milky

¹⁰ In this context Johann Heinrich Lambert should also be mentioned, whom Kant believed to be "the greatest genius in Germany, a man capable of important and enduring contributions to the investigations on which I too am working". (Zweig 1967, 47). Here he was reacting to Lambert's indication that what the latter "said on page 149 of the *Cosmological Letters*" – the view that the Milky Way consisted of fixed stars – "dates from 1749", thus was conceived by Lambert before Kant's own publication. (Zweig 1967, 46). "Right after supper I went to my room, contrary to my habit then, and from my window looked at the starry sky, especially the Milky Way. I wrote down on a quarto sheet the idea that occurred to me then, that the Milky Way could be viewed as an ecliptic of the fixed stars, and it was this note I had before me when I wrote the Letters in 1760."

¹¹ Victor Hugo passes down to us this anecdote told by the astronomer Arago under the entry "Faits contemporains" of the year 1847 in his *Choses Vues*: "Quand Laplace eut publié sa *Mécanique céleste*, disait-il [M. Arago], l'empereur le fit venir. L'empereur était furieux. – Comment, s'écria-t-il en apercevant Laplace, vous faites tout le système du monde, vous donnez les lois de toute la création, et dans tout votre livre vous ne parlez pas un seul fois de l'existence de Dieu! – Sire, répondit Laplace, je n'avais pas besoin de cette hypothèse." (Hugo 1955, 103 f.; also Henrich 2010). A slightly different version of the anecdote is to be found in Faye 1884, 110 f.

¹² "To the last Part of your Letter, I answer, First, that if the earth (without the Moon) were placed any where with its Center in the *Orbis Magnus*, and stood still there without any Gravitation or Projection, and there at once were infused into it, both a gravitating Energy towards the Sun, and a transverse Impulse of a just Quantity moving it directly in a Tangent to the *Orbis Magnus*, the

Way had a divine centre around which the solar systems moved (Wright 1971, 168 ff.; Kant 1977, 210 ff.). Kant, however, dispenses in his reflections with this divine assistance still claimed by Wright,¹³ and for this very reason he devotes his preface to the question of the role played by God in nature. “I did not set out upon this enterprise until I saw myself secure in relation to the duties of religion.” (Kant 2012, 194 (1:222))

His basically deistic solution is as simple as it is brilliant. In a similar vein to Leibniz’ criticism of Newton, he avoids interference by God with nature by praising God as the giver and preserver of the order of the very laws of nature. “*A God exists precisely because nature cannot behave in any way other than in a regular and orderly manner, even in chaos.*” (Kant 2012, 199 (1:228))¹⁴ This is also more important to him than “bringing the miracles of revelation into the same system as the ordinary laws of nature,” (Kant 2012, 258 (1:304)) which he nevertheless attempts point by point in his hypothesis of an early ring of water around the earth by way of explanation of the waters in the heavens, described in the creation story of Genesis 1:6f. (Kant 2012, 258f (1:303-4)).

Kant arms himself against the accusation of intellectual audacity - in seeking to describe the genesis of the cosmos - by referring to the great simplicity of the endeavour compared with the complicated nature of the formation “of a single plant or caterpillar” (Kant 2012, 201 (1:230)). His motto is: “*Give me matter and I will build a world out of it.*” (Kant 2012, 200 (1:230)) With these words, Voltaire criticises Descartes’ physics¹⁵; Kant’s adoption of the quotation

Compounds of this Attraction and Projection would, according to my Notion, cause a circular Revolution of the earth about the Sun. But the transverse Impulse must be a just Quantity; for if it be too big or too little, it will cause the earth to move in some other Line. I do not know any Power in Nature which would cause this transverse Motion without the divine Arm.“ Newton 1978, 279, 296 ff., cf. Kant 2012, 194 (1:221), 195 (1:223).

¹³ He explicitly criticises Wright in this regard: “The deity is equally present in the infinity of the entire universe,” Kant 2012, 279 (1:329).

¹⁴ Also already in Kant 2012, 58 (1:62).

¹⁵ Voltaire 1786, 27 f.: “Donnez-moi du mouvement et de la matière, et je vais faire un monde.”

shows how he attempts, in all modesty, to honour the intention which Voltaire presents as presumptuous.

In order to do this, the first thing Kant needs are the Newtonian laws, which is why he sets them out again in a brief synopsis before beginning the first part of his work (Kant 2012, 12-4 (1:243-6)). The central idea, which Kant then discusses in Part I itself, is that of Wright. “He regarded the fixed stars not as a disorderly mass distributed without any intent, but rather found a systematic constitution in the whole” (Kant 2012, 215f. (1:248)), in that he regarded the fixed stars as suns with their own solar systems, (Kant 2012, 201 f. (1:231)) which circulated around a common central point. In the tradition of natural theology and in particular in connection with the poet Alexander Pope,¹⁶ whom he regarded highly, preceding each of the three parts of his work with a quotation from his poems,¹⁷ Kant sees the demonstrated unfathomability of the cosmos as a reason to praise the Creator (Kant 2015, 222 (1:256), who reveals himself “in such inconceivably great works” (Kant 2012, 215 (1:248)).

The second part of the *General Natural History and Theory of the Heavens* then consists of eight chapters, the last of which Kant highlights in the preface as particularly relevant for the sceptic (Kant 2012, 204 (1:234)). Here Kant again concerns himself with Newton’s divine hand, placing himself within the Natural Theology of his time as follows: “One conclusion is quite correct: If order and beauty shine forth in the constitution of the world, then there is a God. However, the other is grounded no less: If this order was able to flow from universal laws of nature, then all of nature is necessarily an effect of the highest wisdom.” (Kant 2012, 292 (1:346)) The theology in the work should not surprise anyone, as the whole thing has the layout of a physico-theological proof of the existence of God.¹⁸

¹⁶ See Nuttall 1984, 191 ff. Thomas Wright also quoted Pope, who in turn had taken up pluralism from William Whiston. Crowe/Dowd 2013, 15 f.

¹⁷ Taken from Pope 1740, 1 ff. One reason for the intensive use of Pope was an essay contest set by the Berlin Academy of Sciences for the year 1755, for which Kant had prepared a few notes, cf. also Kreimendahl 2011, I, XXXII ff. and Waschkies 1987, 580 ff.

¹⁸ Waschkies 1987, 549 f. inter alia with reference to the preface, cf. Note 13.

Kant's treatise also has a third part¹⁹ or appendix²⁰, which deals explicitly with the more specific subject of this paper, that is, the possible significance of extra-terrestrial life in the cosmos. Kant himself indicates the status of this part in the preface as follows: "Nonetheless, the reader will find somewhat more than mere arbitrariness but somewhat less than undoubtedness in it." (Kant 2012, 205 (1:236)) The subject is later found again in exactly the same intermediate position in the *Critique of Pure Reason*.²¹ In the third part, then, like many great thinkers before him (Dick 1982). Kant occupies himself with the "inhabitants of the planets" (Kant 2012, 295f. (1:352)), by developing the principle of conclusion by analogy to such an extent that he not only assumes that most of the planets are inhabited, but also postulates a principle which explains the differences between the inhabitants of the various planets. What Kant developed for the known solar system is here also applied paradigmatically to the other postulated star systems. Although Kant is aware that "the freedom to invent has no real barriers" (Kant 2012, 295 (1:351)) with regard to this subject, and that a person's imagination can certainly run wild in this context, he is nonetheless convinced that the probability is well-founded (Kant 2012, 195 (1:352)). In this way he postulates that the distance between the various planets and the sun must have a considerable influence on their inhabitants, a conclusion he draws from his theory about the formation of the solar systems, which also constitutes a reversal of Wright's assumptions.²² According to Kant, "the perfection of the spiritual world as well as of the material world increases and progresses in the planets from Mercury on to Saturn or perhaps even beyond it (insofar as there are yet other planets) in a correct sequence of degrees in proportion to their distances from the Sun" (Kant 2012, 302 (1:361)). Since the effect of the sun as the "source of light and life" (Kant 2012, 303 (1:362)) wanes in proportion to the increasing distance, so, as he sees it, the matter and the composition of the planets and their inhabitants must have a correspondingly superior nature

¹⁹ According to the heading in Kant 2012, 294 (1:349).

²⁰ According to the heading in Kant 2012, 295 (1: 351).

²¹ Cf. Section II: Kant's attitude to aliens in his critical period.

²² In contrast to the conception of Wright, who assumes a divine being as the central body of the universe, which "drew all virtue to itself but drove back all vice", Kant's approach is: "then I would seek the most perfect classes of rational beings further away from this centre point than closer to it." Kant 2012, 278-80, 279 (1:330f).

in order to continue to benefit from this effect. This accepts as a given the idea of natural theology that God “has so beneficially ordered everything for the good of the rational beings that inhabit [the planets].” (Kant 2012, 304)

This also means, although Kant is aware of the speculative nature of this conclusion, that sin can only be a problem associated with an *intermediate* distance from the sun, as the beings inhabiting higher planets would presumably be above and beyond its influence due to their superior materiality,²³ whereas those inhabiting lower planets would be equipped “with far too few spiritual abilities to be permitted to bear the responsibility for their actions before the judgement seat of justice” (Kant 2012, 306 (1:363)). With these concluding reflections Kant also circumvents soteriological problems. It was for such reasons that Philipp Melancthon, for example, had rejected the assumption that numerous worlds exist (Dick 1982, 89f.).

Kant, too, was of the opinion “that it is not necessary to assert that all planets must be inhabited” (Kant 2012, 295 (1:352))²⁴, but he also followed the tradition that the *purpose of nature is to be observed by reasoning beings*, and therefore it seemed more appropriate to assume that the planets were (to a great extent) inhabited (Kant 2012, 295f. (1:352)).²⁵ In this regard it is possible, according to Kant, that the planets that are uninhabited have merely not yet fully developed, or have already passed a certain stage.²⁶

II. Kant's attitude to aliens in his critical period

The *General Natural History* makes it clear that the later critiques were written by someone who had himself experienced the temptations of speculative systems (Crowe/Down 2013,

²³ Elsewhere Kant notes a further possible element of superiority in aliens: “The role of the human being is thus very artificial. How it is with the inhabitants of other planets and their nature, we do not know: if, however, we discharge well this commission of nature, then we can well flatter ourselves that among our neighbours in the cosmic edifice we may assert no mean rank. Perhaps among them every individual might fully attain his vocation in his lifetime. With us it is otherwise; only the species can hope for this.” Kant 2011, 113 (8:23).

²⁴ Thereby in the tradition of the atomists, cf. Dick 1982, 10 f.

²⁵ Cf. also Knobloch 2002, 165, 172 f.

²⁶ Cf. the example of Mars.

19f.). Kant is at this point increasingly critical of the more speculative observations of his own work. The extract from it published by J. F. Gensichen in 1781 as an appendix to the German translation of essays by William Herschel omits much of the work, not only because of space constraints. “The rest, [Kant] says, contains too much in the way of mere hypotheses, for him to be able still to approve it completely.” (Gensichen 1791, 201 f.) Parts that were deleted include the preface and several chapters in Part II, including the eighth, and thereby the complete theological framework of the whole work. The whole of Part III was also omitted. (Hamel 2005, 167f.) Anything “merely hypothetical” did not survive. One might have thought that this would also settle the question of the aliens. But the subject of extra-terrestrial life was a lasting one for Kant.

The section of the *Critique of Pure Reason* containing the quotation cited at the beginning of this paper is entitled “On having an opinion, knowing, and believing” (Kant 1998, 684ff. (B 848 ff.)²⁷). Here Kant sets out his well-known categorisation of believing as something in between having an opinion and knowing, as a merely subjectively sufficient, but objectively insufficient taking to be true (Kant 1998, 686 (B 850)). “Only in a practical relation, however, can taking something that is theoretically insufficient to be true be called believing”. (Kant 1998, 686, (B 851ff.)) Within this believing he makes a distinction between *accidental* and *hypothetically necessary* believing (“if I know with certainty that no one else can know of any other conditions that lead to the proposed end” (Kant 1998, 687 (B 852))), where what he calls *accidental* believing is also referred to as *pragmatic*, because, for example, a doctor occasionally has to act pragmatically without knowing any better.

As a touchstone as to “whether what someone asserts is mere persuasion or at least subjective conviction, i.e., firm belief” (Kant 1998, 687 (B 852)) he names *betting*. This would reveal the degree of personal conviction of one’s own assumptions, in particular if all one’s possessions were at stake. “If we entertain the thought that we should wager the happiness of our whole life on something, our triumphant judgment would quickly disappear, we would become timid and we would suddenly discover that our belief does not extend so far.” (Kant 1998, 687 (B 853))

²⁷ Otfried Höffe explains why the heading ends in the word “believing”, although “belief” in the course of the discussion initially only represents an intermediate stage. Höffe 2004, 300 ff.

Analogous to belief in a practical relation stands *doctrinal* belief, which, according to Kant, refers to purely theoretical judgements and certainly demands a means “for arriving at certainty about the matter” (Kant 1998, 687 (B 853)). At this point Kant gives an example of such doctrinal belief in the quotation already cited at the beginning of this paper: “If it were possible to settle by any sort of experience whether there are inhabitants of at least some of the planets that we see, I might well bet everything that I have on it. Hence I say that it is not merely an opinion but a strong belief (on the correctness of which I would wager many advantages in life) that there are also inhabitants of other worlds.” (Kant 1998, 687, B 853) The conditional form is to be understood as being necessary here, since it is about a purely theoretical judgement: in the *Critique of Pure Reason*, Kant does not yet assume that the question of the existence of aliens could ever be settled. Even so, this belief in aliens represents for Kant nothing less than a *textbook example* of doctrinal belief. In the same way, Kant uses inhabitants of the moon to illustrate transcendental idealism. Kant 1998, 512 (B 521). This may be surprising from a modern point of view, and for this reason the historical section of this paper will present the context in which Kant was able to come to this view.

In view of this strong belief in the existence of aliens, it is not surprising that, from an epistemological viewpoint, in the case of Kant this belief is initially on the same level as belief in God. For Kant continues unabashed that we must “concede that the thesis of the existence of God” also “belongs to doctrinal belief” (Kant 1998, 688 (B 854)). By this Kant means the physico-theological conviction of “the presupposition of a wise author of the world” (Kant 1998, 688 (B 854)) when investigating nature, that is, assuming a uniform and meaningful world structure, while constantly striving to “make use of my reason as if everything were mere nature” (Kant 1998, 688 (B854)). Here the positive outcome of natural history experiments serves, he writes, to confirm the viability of this presupposition of a wise author of the world. For this reason it was too little to call taking something to be true merely “having an opinion”, when he, after all, “firmly believe[d] in God” (Kant 1998, 688 (B 854)), but this belief should not be called practical but doctrinal – as, incidentally, should belief in a future life of the human soul (Kant 1998, 688 (B854)). And a merely doctrinal belief of this kind “has something unstable about” it (Kant 1998, 688 (B 855)), as Kant admits.

But *moral* belief, he says, is a different matter, as it is absolutely necessary, because otherwise the very moral principles would be overturned; and because belief both in the existence of God and in a future life also belongs to *this* belief, “nothing can make these beliefs unstable” (Kant 1998, 689 (B 856)).

Here there is therefore already a distinction between the category of belief in the existence of aliens and that of the broader belief in God (incorporating a moral dimension.) and a future world, which perhaps for this reason in the later *Critique of Judgement* leads to the assumption that there are rational inhabitants of other planets being declared a “matter of opinion” (Kant 2000, 332 (5:467)). While in the *Critique of Pure Reason* holding an opinion was defined purely in terms of a deficiency as subjectively and objectively insufficient taking to be true (Kant 1998, 686 (B 850)), Kant emphasizes in the *Critique of Judgement* the positive difference between holding an opinion and believing, stating that matters of opinion are “objects of an at least intrinsically possible experiential cognition” – although this cognition is, of course, “merely because of the degree of capacity that we possess ... impossible for us” (Kant 2000, 331 (5:467))²⁸. The question of the existence of aliens is now no longer a question of belief for Kant, because he now considers this experiential cognition to be verifiable and/or falsifiable. It could therefore even be an object of knowledge: “... for if we could approach more closely to other planets, which is intrinsically possible, we could determine by means of experience whether they exist or not; but we never will come close enough to other planets, so this remains a matter of opinion.” (Kant 2000, 332 (5:467))²⁹

But what would Kant have decided if he had been familiar with the facts as they are known today? The discovery of extra-terrestrial life is moving in our day into the realm of the possible. In Kant’s terms, it is still a matter of opinion. In any case, it is no longer a matter of belief, but has now become a question that is potentially accessible to science.

III. Old and new astronomical insights

Why does Kant assume that aliens exist? Today the debate about aliens appears exotic, perhaps because in the 20th century, apart from the dubious comments of believers in UFOs³⁰ and the unsuccessful experiments of the SETI project, (Wilkinson 2013, 83 ff.) there was an unusual silence on this subject. There was also no longer any certainty whether, apart from the stars, there were even any planets on which life could have existed. (Wilkinson 2013, 27 ff.)

²⁸ Meaning corrected according to Kant 2009, 404f. (B 455).

²⁹ Kant then differentiates himself from Swedenborg, when he describes the assumption of bodiless spirits as poetry rather than opinion.

³⁰ On this subject, compare e.g. Peters 1977.

In earlier centuries, it was different.³¹ The history of the debate about the possibility of extra-terrestrial life shows that Kant's reflections become important in the context of a rich tradition.

Historically, the *Copernican revolution* had led to a great openness in addressing this question, as it made the Aristotelian cosmology obsolete. Since the earth thereby lost its special position in the centre of the cosmos, it was easy to conceive the existence of several "earths". It was at the core of the new type of astrophysics not to regard the sun, the moon and the planets that had so far been discovered as perfect spheres under motionless heavens of fixed stars, but to apply to them the rules that applied on earth. This was an expression of the "Copernican principle" or the "principle of mediocrity", according to which, in a basically uniform universe, the earth does not hold a special position, and which, in a watered-down form, represents no less than the philosophical basis for modern science. (Crowe/Dowd 2013, 7 f.) After applying the principle of mediocrity and observing divine omnipotence, even inhabitants of the stars seemed plausible, but there were equally strong *theological* reservations about assuming Copernicanism to be true. Giordano Bruno was probably the first to maintain that the stars were bodies similar to our Sun, and also surrounded by planets in the same way; (Crowe/Dowd 2013, 8f.) his fate is well known, although the above assertion was undoubtedly not the main reason for his tragic execution. (Dick 1982, 69f.) Philip Melanchthon remained faithful to Aristotelianism against Copernicus, in part because he did not find any references to further universes or inhabitants of other stars in the biblical account of the creation. In addition, serious questions were raised with regard to the Christian doctrine of redemption and incarnation, (Dick 1982, 88 ff.) which Kant's precritical approach so neatly circumvents, because he assumes that sin is a problem only associated with intermediate distance from the sun.

Possibly for similar reasons – although, incidentally, unlike Kepler – Galileo Galilei was also reluctant to postulate inhabitants of other stars, or at least he was warned for these reasons against doing so (Dick 1982, 90 f.).³² On the other hand, in his defence of Galilei, Tommaso

³¹ On the following, see Dick 1982.

³² Although Michael Crowe and Matthew Dowd (Crowe/Dowd 2013, 8 f.) suggest otherwise, Galilei did not rule out the possibility of inhabitants of other stars in general, merely their similarity with people on earth.

Campanella also found biblical arguments in favour of Copernicanism. Thus the biblical account of the creation speaks of waters above and under the firmament, and Campanella applied the water above the firmament to the presumed water reserves on the moon.

Campanella also suggested that the death of Christ on the cross was perhaps not even necessary for the inhabitants of the stars, since the latter were not descended from Adam and were therefore not subject to original sin. In addition, he pointed out that similar ideas had already been discussed with regard to the inhabitants of remote parts of the earth (Dick 1982, 90 ff.).

Galilei himself kept out of the discussion, emphasizing the differences between the earth and the moon despite remaining loyal to Copernicanism (Dick 1982, 96 ff.). John Wilkins, however, was able, following the groundwork of Giordano Bruno in Protestant England, to support the assertion that a world had been discovered on the moon (*Discovery of a World in the Moone*, 1638) and to confront readers with the following question: If, according to Copernicus, the earth is merely one of many planets, why should one of the many planets not be a second earth? (Dick 1982, 97 ff.)

It was René Descartes who in his *Principia Philosophiae* in 1644 formulated a vortex theory, which then made popular the assumption that numerous solar systems existed. However, his followers did not initially assume that these vortex systems also contained other planets, in addition to the suns. It is possible that the difficulties relating to ecclesiastical politics confronting Galilei contributed to the fact that this idea and the related question of the habitation of the planets were not pursued.³³ This changed only with Bernard le Bovier de Fontenelle, the later secretary of the French Academy of Sciences, (Dick 1982, 123 ff.) and with the *Cosmotheoros* (1698), the posthumous late work of the highly-regarded Christiaan Huygens. (Dick 1982, 127 ff.) They explicitly assumed that planets also existed, which orbited the suns in the vortices, and together with these planets, they assumed, came inhabitants.

Just one year after the first publication of de Fontenelle on this subject, Isaac Newton's *Philosophiae naturalis principia mathematica* (1687) turned natural philosophy upside down and at the same time pushed the vortex theory into the scientific sidelines. (Dick 1982, 142 f.)

³³ In private, Descartes believed that the existence of aliens was possible. Crowe/Dowd 2013, 9 f.

Newton's law of gravitation left the question of multiple solar systems open again, and Newton did not initially tackle the question of cosmogenesis in his works. It was in his letters to Richard Bentley that Newton formulated the assumption that the genesis of the solar systems with their planetary motions would be inconceivable without the help of a "divine hand", thus turning against the basically atheistic hypothesis of the atomists. (Dick 1982, 142 ff.)

It should not be forgotten that the existence of other solar systems could not at this time yet be observed, but only postulated. It therefore had to be metaphysical principles which led to this assumption. For it was for teleological reasons that Bentley assumed that all heavenly bodies had been created for the purpose of their respective inhabitants. In this way the assumption of inhabited solar systems became a part of the entity that we know as natural theology, of taking the evidence of the glory of God from the works of nature. (Dick 1982, 149 f.)

A famous work in this tradition was William Derham's much-read *Astro-Theology* (1715), which used each astronomical detail as a proof of divinity. It was also Derham who, on a Newtonian basis, popularised the assumption of multiple solar systems as a third, "new system" following the Aristotelian and Copernican approaches. The suns were there in order to bestow light and warmth on their own inhabited planets. (Dick 1982, 151 f.) An echo of these discussions, in the light of which his position certainly also becomes clearer, is finally to be found in Kant's examination of the subject.

William Herschel, the greatest astronomer of the time, was also a passionate apologist for the habitation of other planets, also of the moon and even the sun, (Crowe/Dowd 2013, 20 ff.) which he believed to be merely a particularly large and bright planet. (Crowe 1999, 67 f. Crowe/Dowd 2013, 33 ff.) At the end of the 18th century, belief in extra-terrestrial inhabitants of planets was so widespread that Thomas Paine, in his book *The Age of Reason*, was able on this basis to attack the Christian faith: "to believe that God created a plurality of worlds, at least as numerous as what we call stars, renders the Christian system of faith at once little and ridiculous, and scatters it in the mind like feathers in the air." (Paine 1794, 84 f.)

IV. What do the heavens declare?

Around the beginning of the 19th century it was therefore no longer at all certain that "the heavens declare the glory of God" (Psalm 19:1), while the "population" of the heavens was at the same time supported by the scientific consensus. When John Herschel, a highly-regarded astronomer and philosopher of science, demanded in his *Preliminary Discourse on the Study*

of *Natural Philosophy* (1830) strict scientific criteria, in particular for astronomy, because its discoveries stood in open contradiction to superficial observation, his example of this is counter-intuitive from a modern perspective: “The planets, which appear only as stars somewhat brighter than the rest, are to (the astronomer) spacious, elaborate, and habitable worlds.” (Crowe/Dowd 2013, 27 f.) Thus, from his viewpoint, it was the in-depth analysis itself that led to the discovery that some stars were in fact habitable planets. August Comte, too, thought that astronomy was the only science that had left theological and metaphysical developmental stages behind, and the heavens declared the glory only of Hipparchus, Kepler, Newton etc. At the same time, he maintained that it could be taken for granted that the planets of the solar system were inhabited. (Crowe/Dowd 2013, 27 ff.)

By the mid-19th century the tensions between religion and astronomy had to a great extent subsided. It was widely assumed that belief in extra-terrestrial life was not only compatible with religion but even supported it, (Crowe/Dowd 2013, 37 f.) as envisioned, for example, by Thomas Chalmers, in his *Astronomical Discourses* (1817).

It was then the aliens themselves whose existence was called into question, and this was done by William Whewell, who published the book *Of the Plurality of Worlds: an Essay* in 1853, linking its title to the predominant tradition – as embodied by such people as Chalmers – only to reject this tradition in the course of the work.³⁴ This was based on his evaluation of the existing astronomical and scientific facts, which he used for apologetic purposes to re-establish the special position of the earth.³⁵ What is interesting about this is not so much the recovering anthropocentrism on religious grounds linked to Psalm 8, but the incorporation of the contemporary state of facts in natural sciences and the sense of the speculative nature of many assumptions which had until then been regarded as scientific: “Men have been so long accustomed to look upon astronomical science as the mother of certainty, that they may confound astronomical discoveries with cosmological conjectures; though these be slightly

³⁴ In his treatise *Astronomy and General physics Considered with Reference to Natural Theology*, published in 1833, Whewell still assumed that aliens existed.

³⁵ “Why should not the Solar System be the chief and most complete system in the universe, and the earth the principal planet in that System? So far as we yet know, the Sun is the largest Sun among the stars; and we shall attempt to show, that the earth is the largest solid opaque globe in the solar system.”, Whewell 1853, 160.

and illogically connected with those.” (Whewell 1853, 101 f.) In evaluating the geological discoveries of his time, he was in this way even able to challenge the long-established metaphysical *principle of abundance*, according to which populated worlds give the creator greater glory than empty outer space, since even on earth, as was now known, there had been numerous populations which – even before Darwin’s *Origin of Species* of 1859 – were regarded as separate new creations. (Whewell 1853, 103 f.) By evaluating the facts, Whewell also recognised, for example, that the level of radiation from the sun made the inner planets of our solar system very hot and the outer planets very cold, and that the low density of Jupiter suggested that it had no surface at all. He therefore already had a notion of the modern concept of the “habitable zone”³⁶, the area of the solar system in which habitable planets could exist. However, he also assumed that the hypothesis that nebulous areas in the starlit sky were universes comparable to our Milky Way was false. “And thus we are not, I think, going too far, when we say, that our Solar System, compared with spiral nebulous systems, is a system completed and finished, while they are mere confused, indiscriminate, incoherent masses.” (Whewell 1853, 136 f.) Although he was wrong about this, even at the end of the 19th century his views still corresponded to the predominant opinion of research. (Crowe/Dowd 2013, 44 f.)

Whewell provoked a debate, but belief in numerous habitable worlds was not yet permanently shaken by his ideas. (Dick 2001, 17 f.) However, the tendency is clear: science was now beginning to regard the existence of numerous habitable worlds as improbable. (Wilkinson 2013, 27 f.) When it became increasingly clear that the Sun, due to its temperature, and the Moon, due to its lack of an atmosphere, could not host any life, attention was then turned to Mars, on which Giovanni Schiaparelli first claimed to have observed canals in 1877. The public discussion of this issue led amongst other things to H.G. Wells’ classic *The War of the Worlds*, but at the turn of the 20th century the opinion took shape that the alleged canals were optical illusions. (Crowe/Dowd 2013, 46 ff.) Thus the aliens were “expelled” from the solar system at this time. The number of expected planetary systems in the universe had also significantly decreased due to the abandonment of the hypothesis that the nebulae represented separate galaxies, and the remaining fixed stars were also not able to host any life due to their sun-like nature. It was science that made the idea of numerous worlds become improbable. But it was also science that took up this idea again, following new discoveries.

³⁶ “The Earth’s Orbit is the Temperate Zone of the Solar System.” Whewell 1853, 196.

V. Challenges today

It was not until 1995 that the first planet outside our solar system, orbiting a star similar to the sun, so the first real “exoplanet”, was discovered by Swiss astronomers Mayor and Queloz. Through the use of space telescopes, in particular, about 2000 exoplanets have now already been detected, and it is believed that approximately one in every ten stars has at least one planet. (Batalha 2014, 12647) Since the Milky Way contains at least 300 billion stars, (Gribbins 2008, 28) that would still add up to at least 30 billion planets existing in our galaxy alone. The habitability of the planets, that is, whether they lie within the “habitable zone”, depends crucially upon their distance from the relevant sun. In our solar system, for example, Mars is also situated just within this zone, and is certainly a good example of Kant’s assumption that the planets that are uninhabited may already have passed beyond a certain stage. Thus even today it is believed in the case of Mars that it is quite possible that it may once have hosted life. (Wilkinson 2013, 9 ff.) Even if only a fraction of the existing planets *could* host life, and of those, again only a fraction actually *did*, in our galaxy alone that would still amount to a substantial number of planets.³⁷ However, this then raises the question of where all the aliens are. This paradox has led Enrico Fermi, amongst others, to assume that in our galaxy there is no other intelligent life. However, there are also other approaches to responding to this paradox. (Webb 2002)

Whatever the case may be regarding life beyond our planet, the question has been treated as a matter for “exobiology”. However, since no life other than that originating on earth has yet been found in space, the purpose of this discipline has been questioned, some maintaining that it seemed to be the only scientific discipline of which it was not possible to be certain that its subject actually existed.³⁸ The discipline was therefore re-invented under the heading of “astrobiology”, in which life on and from earth is considered in the context of outer space (Catling 2013, 5 f.). As has been demonstrated, however, outer space is rather large, and the total absence of life elsewhere must be somewhat improbable, especially since life on earth is based on the most common elements in the universe. (Catling 2013, 9 ff.) On the other hand,

³⁷ The tool for calculating these probabilities is an equation developed by Frank Drake. See e.g. Wilkinson 2013, 39 ff.

³⁸ If one wishes to follow Kant's argumentation, it has this in common with theology. Only the ethical importance of theology protects it, in Kant's view, from the consequences.

due to the vast distances between solar systems, it is possible that we may never be able to come into contact with any extra-terrestrial life, at least according to our present-day understanding of future technological possibilities.

Theological study of the implications of the possible existence of extra-terrestrial life is carried out in line with the biological sub-disciplines under the headings of “exotheology” (Cf. Peters 1994, 1) or “astrotheology” (Peters 2014, 443). The necessity of such a discipline becomes clear when the popular physicist Paul Davies, for example, comments that “The existence of extra-terrestrial intelligences would have a profound impact on religion, shattering completely the traditional perspective of God's special relationship with man. The difficulties are particularly acute for Christianity, which postulates that Jesus Christ was God incarnate whose mission was to provide salvation for man on earth. The prospect of a host of ‘alien Christs’ systematically visiting every inhabited planet in the physical form of the local creatures has a rather absurd aspect. Yet how otherwise are the aliens to be saved?” (Davies 1983, 71) One is reminded of Thomas Paine’s objections at the end of the 18th century. The theologian Ted Peters, on the other hand, sees numerous possibilities for approaching the proposed task in a constructive way, and refers to the reflections of numerous theologians, including modern ones, in this direction (Peters 1994).

So, what is the challenge for theology? There are basically five different scenarios (with differing epistemological status), each of which presents its own challenge to theology:

Scenario 1: There is no other life in space. This negative scenario is often assumed, but cannot be epistemologically verified, because the universe is simply too big. (Akerma 2002, 285 f.) The assumption of this possibility does, of course, make it possible to preserve the old habits of thought and to believe that the earth and mankind are something quite special in the universe, but it can also lead to a *horror vacui*, if one thinks, for example, of Jean Paul’s *Speech of the Dead Christ from the Universe*. (Richter 1826, 154)

Scenario 2: Apart from life on earth, there is only “simple” life in space. Although it would be possible to verify such life provisionally, in this case one would also never know whether there was more complex life somewhere in the universe, which would then negate the scenario. All the same, in the event that such “simple” life were to be discovered, it might be possible to settle the question of the origin of life on earth, and in a certain sense, therefore, that of Genesis. A precondition for this would be that great care be taken to avoid contamination from one side to the other; this is an example of a field of “astroethics” that would need to be developed. (Peters 2013, 200, 201 ff.)

Scenario 3a: There is intelligent life beyond our planet, but it is too far away to be detected. It is not currently possible to distinguish epistemologically between Scenarios 1 and 3a. It would therefore be wise, in view of the probabilities mentioned above, to assume Scenario 3a. This could, following technological advances, be transformed into Scenario 3b. In view of the discovery and increasing mapping of the exoplanets, these technological advances could perhaps even be achieved within our lifetime.

In Scenarios 1 to 3a, we are in the area of Kant's "having an opinion". We have seen that it was in the very process of his increasingly critical reflections on the subject that Kant realised that the existence of extra-terrestrial life should not be the subject of pure speculation, and is not a question of belief, but will one day in principle be verifiable, and could therefore be transformed into *knowledge*. This is covered by the following two scenarios, 3b and 3c.

Scenario 3b: There is intelligent life beyond our planet and we can detect traces of it, but it is too far away for us to make contact with it. This situation could occur due to technological development in one of the affected civilisations, and through this development it could also be transformed one day into Scenario 3c. In this case, mankind ought to prepare itself for the subsequent scenario, but theological reflections would be essential beforehand. This would re-open on an interplanetary scale the questions of religious dialogue on earth; thus the theology of the religions can already give this matter some important preparatory thought.

Scenario 3c: There is intelligent life beyond our planet, and we can make contact with it. The question then would be, friend or foe? This may also depend on the type of dealings in the first meeting, and in addition to the theological issues, raises the question of the development of a comprehensive, appropriate field of astroethics. (Peters 2014, 454 ff.; Peters 2013) The postulated transitions between the different scenarios do, of course, contain a certain optimism with regard to progress, which in my opinion appears justified due to the very rapid technological evolution of mankind on a cosmic scale.

The assumption of extra-terrestrial life currently, however, continues to be an object of speculation, and Kant's wager is still open. In the last two scenarios, Kant would win his wager. For the Christian faith, however, what would be at stake in this case, for example regarding the concept of the incarnation? It would certainly require a separate paper to present this.³⁹ Precisely by reviving this old debate, the field of theology can prepare itself for the

³⁹ See, for example, the approach to the subject in Losch/Krebs 2015.

probable or at least possible future, in order to make a contribution to the orientation of mankind.

However, in conclusion it should still be borne in mind that it is of course a question of principle whether faith should even be interested in these issues. In view of the predominant paradigm in continental Europe of mutual independence between theology and science this question is not in the least trivial. In times of Nazi Germany, it was a most important contribution of Karl Barth's theology to insist on the "one word of God" and reject an assimilation to the "German-Christian" spirit of the age, resulting in the Barmen declaration. Would it not be a betrayal of that theological legacy, if such important events for the global community as the discovery of extra-terrestrial life were also given a potential theological significance? In any case, in the development of the theology of religions one would have to be very vigilant about keeping to the word of God alone "as a source of Church proclamation" (Barth 1957, 175). Karl Barth himself went through this using examples in his doctrine of lights (Barth 1961, § 69 The Glory of the Mediator). If one wishes to adhere to the revelatory nature of the word of God, one must not give up the universalist claim of biblical belief, otherwise the monotheistic concept of God will also be given up. Thus even if the inhabitants of alien worlds have their own suns, the revelation and illumination must come to them from the single Source of Light which also appeared to us here on earth.

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