

IN THE SHADOW OF THE ENLIGHTENMENT:

I. REIMARUS AGAINST THE EPICUREANS

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The eighteenth century, without really meaning to be, was deeply concerned with the origin of mind: Where did it come from? For how one replied to this question was at the root of one's political, religious, and social beliefs.

By the middle of the century, there were three answers: (1) The traditional view that mind is simply God's creation and was somehow imposed by Him on the physical body. The chief exponents of this view had been Descartes and Catholic doctrinal writers. (2) The new empiricist view, dominating the Enlightenment, that mind originates in individual experience. After Hobbes, it had been Locke in England and Condillac in France who with stunning originality had led the best intellects of the day over to this socially hopeful position. (3) The radical materialist view, known in the seventeenth and eighteenth centuries as Epicurean, stating that all life in all its aspects originated in matter.

An inseparable part of any theory of the origin of mind, its "decisive trial" as Hume put it, is the nature and origin of mind in animals. In (1) the traditional view, the usual teaching was that man has a rational mind given him by God along with free will to use it, while animals have instincts whose seeming rationality is the rationality of God Himself. *Deus est anima brutorum* was a common scholium of the period. Descartes had practically caricatured this position with his theory of animals as automata. It had complicated the intellectual issues by introducing an era of such cruelty to animals as Samuel Johnson had found it impossible to speak about "without more emotion than my love of quiet willingly admits." The result was an explosion of extravagant theories of animals to protest the Cartesian caricature: Guillaume-Hyacinthe Bougeant's quasi-Platonic view that animals were human souls in Purgatory, and others, such as John Hildrop and Jean Antoine Guer, and even Leibniz agreeing that animals had immortal souls.

In (2) the empiricist view, there was no great difference between animals and men. Both learned their behavior and thought from experience. Locke felt some animals could perhaps reason about sensible particulars, but could not enlarge their ideas by any kind of abstraction. Hume went further, denying any essential differences between animal and human reason. Abbé Condillac's *Traité des animaux* projected these suggestions into the major theory of animal behavior of the Enlightenment. It even became fashionable to think that animals, like humans, were perfectable by education, a belief requiring and eagerly devouring such humanizing evidence as naturalists like Charles Bonnet, René-Antoine de Réaumur, and particularly Charles-Georges Leroy were soon to supply.

In (3) the Epicurean view, as in intellectual dilettantes such as La Mettrie, there was no particular problem. Since the origin of everything was in matter, there was no essential difference between man and animals. Mind was just an

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organization of matter in both. Thus by the middle of the century, there was a spectrum of views from the Cartesian beast machine to the complete empirical animal all of whose behavior is learned.

It is into this spectrum and against this triangle of notions about the origin of mind that we wish to place the subject of this essay. Hermann Samuel Reimarus is at the traditionalist vertex. But he is a natural religionist who is very careful to distinguish himself from the Cartesian proponents of mechanical caricatures who share that vertex with him. His two major works are against the other two vertices. The first is against the Epicureans, demonstrating a divinely created world. And the second is against the Empiricists, explaining animal behavior as a result of innate drives.

Reimarus is certainly important, but perhaps not great. His achievement, so far as psychology is concerned, was to divert discussion from a conventional instinct-learning polarity into an opening up of the concept of motivation. He can be called the originator of the concept of drives, which is presently central to much psychological theory. Because he is a forgotten figure in the history of ideas, and because the mid-twentieth century in its views of the nature of life and mind is very similar to the mid-eighteenth century, we feel it is appropriate at this time to return Reimarus to the attention of current discussions.

#### *The Man and His Work*

Hermann Samuel Reimarus<sup>1</sup> was a pious preparatory school teacher of Hamburg whose house was a local center of culture and intellectual exchange. Personally, he was an excellent example of a new type of German intellectual in the eighteenth century. "*Ich will jedes Ding sehen, wie es ist,*" he once wrote, and he lived his life accordingly, impressing his many friends as a man full of clarity, transparently sincere, and amazingly sure of himself.

Born in Hamburg 22 December 1694, the son of a professor at the local gymnasium, he was first educated by his father<sup>2</sup> and then by the noted scholar, Johann Albert Fabricius. As a youth, he was precociously fluent in Latin, Greek, and Hebrew. Around Easter 1715 he went to the University of Jena, where he heard the lectures of Johann Franz Buddeus (1667-1729), the Pietist-inclined professor of theology, and came under his influence. From this period issued Reimarus' later critical stance toward the truths of positive religion, for Buddeus was just then writing his refutation of atheism and superstition, a compilation and refutation of the arguments throughout written history against divine providence, immortality, angels, prophecy, miracles, resurrection, and the Holy Scriptures.<sup>3</sup> In 1716 Reimarus became *Dozent* at the University of Wittenberg, where he published his first work *De differentiis vocum Hebraicarum* in 1717 and his second, *Abhandlung über Machiavellismus vor Machiavell*, in 1719. He remained there, except for a trip to Holland and England in 1720-1721, until 1723, when he accepted a call

<sup>1</sup>See the *Encyclopædia Britannica*, 13th ed. (N. Y.: The Encyclopædia Britannica Co., Inc., 1926), 23, 53. Also the *Allgemeine deutsche Biographie* (Berlin: Duncker & Humblot, [1898] 1970), 27, 702-4.

<sup>2</sup>Nikolaus Reimarus, his father, was the son of a Lutheran pastor. He studied theology at Kiel University and became tutor to the son of Senator Schaffhausen, the later mayor of Hamburg, before taking an academic position at the Johanneum in Hamburg.

<sup>3</sup>J. F. Buddeus, *Theses theologicae de Atheismo et Superstitione* (Jena: J. F. Bielckius, 1717), 240-306.

to become rector at the *Stadtschule* in Wismar. Here he published his brief Latin treatise, *Instinctum brutorum existentis Dei, eiusdemque sapientissimæ, indicem*, in 1725. It is a rare work which we have not been able to consult. As its title suggests, it simply states the traditional teaching of John Ray and the English school of natural theology that the instincts in animals demonstrate the benevolent wisdom of God's creation. Its interest here is to show the priority of involvement with the problem which Reimarus was to turn to later in his life. He would have learned of the argument of design both from study of the classics under Fabricius and from Buddeus, whose writings show an intimate familiarity with the works of John Ray, Richard Lower, Samuel Parker, Richard Bentley, and Thomas More, as well as the ancients Galen, Pliny, and Plutarch.<sup>4</sup>

It is important to understand another motivation for Reimarus' work on animal instincts, in the person of the philosopher Christian Wolff (1679-1754). In 1723 Wolff had been dismissed from the University of Halle on charges of atheism by the Prussian king, Frederick William I. Reimarus would certainly have known his works and his reputation by then, the more so as Buddeus wrote an essay to censure Wolff's philosophy for its determinism and its definition of God, which "opened gate and door to atheism."<sup>5</sup> The fifth chapter of Wolff's recent book on "God, the world, and the soul" would have attracted his attention, as it did Andreas Rüdiger's, for its declaration that animals have souls, "but no understanding and reason, §869, 277, no will, §889, and no freedom, §891."<sup>6</sup> What this disagreement between Wolff and the twelve-years-older Buddeus meant to Reimarus was the need to work out his own philosophical opinion, not only with regard to animals but especially to man. Nor was it a simple matter of rejecting the viewpoint of the elder mentor, for Buddeus was more receptive to the Empiricists, and less deferential toward the Cartesian traditionalists, while Wolff in his physical atomism was far closer to the radical materialist view.

In 1727 Reimarus applied for a teaching appointment at the Hamburg Academic Gymnasium (which he had attended as a youth); in the following year he was accepted for his lifelong position as Professor of Oriental Languages, and he married Jeanne Frédérique, the daughter of his teacher and now colleague, Fabricius. His duties were light and he devoted his life to his writing, his family (only 3 of his 7 children survived him), and his students, whom he spent long hours tutoring in languages. He published a biography and bibliography of his father-in-law when he died,<sup>7</sup> and he also brought to completion the latter's translation of a work of Dio Cassius.

From this time to about 1745, Reimarus was deeply involved in biblical studies which resulted in his heretical "Apology, or Defense for the Reasonable Worship-

<sup>4</sup>*Ibid.*, 391ff. It is quite possible, of course, that Reimarus was directly acquainted with English thinkers of his own day through his trip there. Then too, the poet Barthold Heinrich Brockes (1680-1747), also a student of Fabricius and of Reimarus senior, was known to have deistic leanings which he may have shared with the younger Reimarus, when they taught together at the Johanneum.

<sup>5</sup>J. F. Buddeus, *Bedencken über die Wolffianische Philosophie* (Freyburg: T. V. Schmalzen, 1724), 1.

<sup>6</sup>C. Wolff, *Meinung von dem Wesen der Seele und des Geistes* und A. Rüdiger's *Gegenmeinung* (Leipzig: J. S. Heinsius, 1727), §892, 274. This "Opinion" of Wolff was actually a reprint of the fifth chapter of his *Vernünftige Gedancken von Gott, der Welt und der Seele des Menschen, auch allen Dingen überhaupt* (Frankfurt & Leipzig: 1720), so Reimarus would have known of it by 1725.

<sup>7</sup>H. S. Reimarus, *De vita et scriptis Joannis Alberti Fabricii commentarius* (Hamburg: V. Felgenhauer, 1737), 1-117 (biography), 118-211 (bibliography), 212-354 (excerpts from letters).

pers of God."<sup>8</sup> He shows himself here to be the most consequential proponent of the eighteenth century religion of reason (*Vernunftreligion*), the German intellectual movement akin to deism, which more and more came to question miracles, supernatural revelation, and the resurrection. Where Christian Thomasius had seen no issue in teaching *Gottesgelährtheit* and matters of divinity to courtiers, and Buddeus had brought historical theology to university students, Christian Wolff had gone so far as to teach that miracles and revelation are limited to those things men have to know but can never be grasped by reason. Reimarus took the final step away from revealed religion when he composed his "Apology" for natural religion. Miracles such as the crossing of the Red Sea by the Israelites are demonstrably contradictory and false. The real truth of Jesus' teaching must come from close scrutiny of the gospels. Reimarus accuses the apostles of introducing elements of Jewish doctrine such as the prediction of the Messiah and of trying to build a mysterious system around this. He calls Jesus a "secular saviour" and yet defends "the pure teaching of Christ . . . which contains nothing but a reasonable, practical religion."<sup>9</sup>

Reimarus feared persecution for his wife and children (as well he might), and the "Apology" was carefully suppressed during his lifetime. He once complained how "those gentlemen, the clergy, may be sure that an honest man does no little violence to his conscience when his whole life long he is obliged to dissemble."<sup>10</sup> Gotthold Ephraim Lessing, the great German critic and dramatist, who was given the manuscript by Reimarus' daughter, was the first to dare publish certain chapters disguised under the title "Wolfenbüttel Fragments" (named after the castle library where Lessing was librarian and where the manuscripts had supposedly been discovered). Some more of this dangerous-to-print work was published in 1787 by C. A. E. Schmidt, a pseudonym for Andreas Riem,<sup>11</sup> even more chapters by Wilhelm Klose in 1850,<sup>12</sup> and still more with a biography and an excellent summary of the remaining unpublished material by David Friedrich Strauss.<sup>13</sup> The entire manuscript has not been published to this day.<sup>14</sup> It is important, as we try to understand the whole of Reimarus' work to realize that he always had this dramatically sincere heretical manuscript hidden in the drawers of his desk.

<sup>8</sup>H. S. Reimarus, "Apologie oder Schutzschrift für die vernünftigen Verehrer Gottes", unpublished in toto. G. E. Lessing first published part of it as the so-called "Wolfenbüttel Fragmente" in his *Zur Geschichte und Literatur aus den Schätzen der Herzoglichen Bibliothek zu Wolfenbüttel*, Beiträge 3-4, 1774-7. Then he published the seventh chapter (to follow the previous six) separately under his own name: *Von dem Zwecke Jesu und seiner Jünger. Noch ein Fragment des Wolfenbüttelschen Ungeannten*, Braunschweig, 1778. Cf. *Lessings Werke*, ed. by C. Gross (Berlin: G. Hempel, 1868-79), 15, 83-439.

<sup>9</sup>*Lessings Werke*, *ibid.*, 15, VII, §32, 345; I, 85.

<sup>10</sup>Quoted in H. Höffding, *A History of Modern Philosophy*, Meyer trans. (N. Y.: Dover, 1955 [1900]), 2, 12.

<sup>11</sup>A. Riem (1749-1807?) was a Protestant minister and writer who became chaplain at Friedrichs Hospital in Berlin. He resigned his spiritual office in 1789, after the Wöllner religious edict of 1788 brought about a disciplinary investigation of his writings on rational religion. Among the latter was an edition of Reimarus' "Apologie": C. A. E. Schmidt, ed. pseud. *Uebrigere noch ungedruckte Werke des Wolfenbüttelschen Fragmentisten. Ein Nachlass von Gotthold Ephraim Lessing*. Berlin, 1787.

<sup>12</sup>W. Klose, *Niederss Zeitschrift für die historische Theologie*, 20, 519-637; 21, 513-578; 22, 380-494.

<sup>13</sup>D. F. Strauss, *Hermann Samuel Reimarus und seine Schutzschrift für die vernünftigen Verehrer Gottes*. Leipzig: F. A. Brockhaus, 1864.

<sup>14</sup>Dr. Erika Kunz, librarian at Murhardsche Bibliothek, Kassel, W. Germany, is reportedly preparing a critical edition of it. Cf. the recent translations of the seventh chapter: *H. S. Reimarus, The Goal of Jesus and His Disciples*, trans. & intro. by G. W. Buchanan. Leiden: Brill, 1970; *Reimarus: Fragments*, ed. by C. H. Talbert, trans. by R. S. Fraser. Philadelphia: Fortress, 1970.

His next published work was an enormous, annotated translation of Dio Cassius' *History of Rome*.<sup>15</sup> Dio Cassius had been governor of Smyrna and Pergamos, and a Roman senator, before he became consul under Emperor Alexander Severus in 229 A. D. Reimarus finished the work, which Fabricius and another scholar had begun, during 1750-1752. This confirms the fact that Reimarus was an accomplished philologist and historian, immersed in the literature of antiquity and the middle ages, yet all the while abreast of the latest thinking in theology, natural science, and as we shall now learn, philosophy.

We take up Reimarus book on logic of 1756, the *Vernunftlehre*,<sup>16</sup> before his book on natural theology of 1754, because we feel that it forms the backdrop for his contribution to psychology.<sup>17</sup> It may have been sketched as lecture notes as early as the 1720's during the famous Wolff controversy. Once published, it ran to five editions, suggesting a wide readership. Indeed, Reimarus' son affirms that his father revised it for lectures in the *Gymnasium* in 1758, when a detailed folding outline was added. The subtitle summoned young and old readers alike "to the correct use of reason in the recognition of truth," and the book reiterated this basic assumption (borrowed for the book's motto from Cicero) *notatio naturae peperit artem*, the observation of human and animal nature brings forth art, or as Reimarus meant to say, the comparison of animal and human nature brings forth the art of reason.<sup>18</sup>

The heart of logic, as conceived by Reimarus, was the distinction between the reasoning powers of man and the instincts of animals. The setting of the problem into psychology was entirely understandable, given the assumption that reason was natural logic employed by everyone, only perfected by rules. The rules, indeed, came from nature too. Reimarus wrote:

Whoever sees that 2 plus 2 comprises as many units as the number 4 . . . must necessarily admit . . . the rule of identity . . . and he cannot think the contradiction. . . . If he makes of a circle in his visual image (*Denkbild*) a rectangle, then the circle disappears from his awareness (*Vorstellung*). . . . Reason directs itself by the rule of contradiction in the comparison of things.<sup>19</sup>

In short, a thing is what it is (rule of identity), and a thing cannot at the same time both be and not be (rule of contradiction).<sup>20</sup> The originality here is not in the rules

<sup>15</sup>H. Valesius, J. A. Fabricius, and H. S. Reimarus, eds. of chaps. 1-35, 36-60, 61-80, respectively. *Cassius Dio Cocceianus Historiae Romanae quae supersunt Graecae ex codicibus MSS et fragmentis supplevit, emendavit, Latinam versionem Xylandro-Leunclavianam limavit, varias lectiones notas adiecit*. Hamburg: C. Herold, 1, 1750, 2, 1752, 1708 pages.

<sup>16</sup>H. S. R. [Hermann Samuel Reimarus] P. J. H. [Professor am Johanneum Hamburgs], *Die Vernunftlehre, als eine Anweisung zum richtigem Gebrauche der Vernunft in der Erkenntnis der Wahrheit aus zwoen ganz natürlichen Regeln der Einstimmung und des Widerspruchs*. Hamburg: J. C. Bohn, 1756<sup>1</sup> [1758<sup>2</sup>. 1766<sup>3</sup>, 1782<sup>4</sup>, 1790<sup>5</sup>].

<sup>17</sup>Cf. Max Dessoir, *Geschichte der neueren deutschen Psychologie* (Berlin: C. Duncker, 1902), 169-170.

<sup>18</sup>It was Leibniz who had coined the term *Vernunftkunst* or art of reason. Christian Thomasius, in the *Einleitung zu des Vernunftlehre* of 1691, retained this practical connotation; his was a logic propaedeutic to theology and jurisprudence. However, his followers shifted the goal of logic to a propaedeutic for *Weltweisheit*, or an instrument of knowledge. This was the tradition of Buddeus' *Elementa Philosophiae Instrumentalis* in 1703 and Wolff's *Vernünfftige Gedanken von den Kräften des menschlichen Verstandes* in 1712, two books which went through many editions. Reimarus' logic, therefore, was a lineal descendant of an heritage which combined formal logic with its practical application.

<sup>19</sup>Reimarus, *Vernunftlehre*, Intro., §§30-31, 34-35.

<sup>20</sup>*Ibid.*, §29, 33.

themselves; they were central to the Leibniz-Wolff philosophy which dominated the eighteenth century in Germany. Nor was it even in the psychological language, for this was the heritage of the Cartesian discussion of innate ideas based on clearness and distinctness. The emphasis Reimarus gave to this discussion was new, however. Reason was not simply a formal mental operation in the affirmation or denial of propositions as it had been for Wolff, nor was it the power of reflection in Locke. It was the faculty which gave man superiority over animal.<sup>21</sup> Indeed, according to Reimarus, men have nine advantages over animals: (1) greater clearness in awareness and concepts, (2) leading to universal or abstract knowledge; (3) ability to attach words to general concepts, thus to understand language and be understood, (4) along with a clear consciousness of self and of things outside of self; (5) men can invent sciences by deductive inferences from concepts; (6) they can acquire knowledge of hidden causes, of future events, of the soul, and of God; (7) they have insight into proportion, identity, completeness, beauty, wisdom, intention - of which animals know nothing - and finally (8) they have knowledge and feeling for moral good, duty, law, virtue, yet also (9) the wisdom to choose freely after comparison of two possible actions or things which are good for them, or among many goods the best, or among many bads the least. By contrast, concludes Reimarus, the animals are determined through mere sensory awareness, or *Instinct*, to perform actions in a definite way.<sup>22</sup>

The two works of Reimarus which remain to be mentioned are his most important from the standpoint of animal psychology and they will be described more fully. They are *Die vornehmsten Wahrheiten der natürlichen Religion*<sup>23</sup> in 1754 and *Allgemeine Betrachtungen über die Triebe der Thiere*<sup>24</sup> in 1760. These works, in addition to *Die Vernunftlehre* of 1756, attracted enough notice to bring him an offer of a chair at the University of Göttingen on the death of Gesner, the philologist, in 1761. However, Reimarus refused the chair, probably because of his age and strong local connections (he had helped found several intellectual societies in Hamburg). His last writings were a reply to a critic and some further considerations on the special kinds of *Triebe* (drives). These were published as appendices to the second and third editions, respectively, of his *Triebe der Thiere*.<sup>25</sup> In 1768, feeling he was going to die, he invited a few friends to dinner to cordially take his leave of them, and then died on 1 March a few weeks later.

#### *The Epicureans of the 18th Century*

Who in fact were the Epicureans whom Reimarus was protesting against? It should immediately be pointed out that it was not for their atomism that they were of concern, but for their anti-Creation doctrine of evolution. The idea that there was at one time a beginning of animal life and that new species grow out of

<sup>21</sup>*Ibid.*, §24, 27-28, §57, 60.

<sup>22</sup>*Ibid.*, §25, 29-32.

<sup>23</sup>H. S. Reimarus, *Die vornehmsten Wahrheiten der natürlichen Religion in zehn Abhandlungen auf eine begriffliche Art erklärt und gerettet*. Hamburg: J. C. Bohn, 1754<sup>1</sup> (1755<sup>2</sup>, 1766<sup>3</sup>, 1772<sup>4</sup>, 1782<sup>5</sup>, 1791<sup>6</sup>).

<sup>24</sup>H. S. Reimarus, *Allgemeine Betrachtungen über die Triebe der Thiere, hauptsächlich über ihre Kunsttriebe, zur Erkenntnis des Zusammenhanges zwischen dem Schöpfer und uns selbst*. Hamburg: J. C. Bohn, 1760<sup>1</sup> (1762<sup>2</sup>, 1773<sup>3</sup>, 1798<sup>4</sup>).

<sup>25</sup>H. S. Reimarus, "Angefangene Betrachtungen über die besonderen Arten der thierischen Kunsttriebe", *ibid.*, 1773<sup>3</sup> and 1798<sup>4</sup>.

previous species in a kind of ordered progression up toward man is, of course, as old as Anaximander in the sixth century B. C. Several other early philosophers, such as Empedocles, added various things to the idea. In the third century B. C., it was said to be more seriously espoused by Epicurus, though his writings on the subject no longer exist. The evidence comes from the first century B. C., when it was written down in Book VI of Lucretius' *De rerum naturae*, and so was passed on in classical literature to the future ages as part of the Epicurean philosophy. The plowing under of old ideas and authorities in the Renaissance and the Reformation had turned up these notions again.

In 1649, P. Gassendi's *Syntagma philosophiae Epicuri*, besides retrieving atomism for Western science, wove the Epicurean implications for ethics and the origin of mind very elaborately into the escalating complexities of seventeenth century thought. So prevalent did the idea of life evolving from matter become, that even as early as 1667 we find Sir Matthew Hale, the prominent British jurist, writing his now neglected treatise, *The Primitive Origination of Mankind*, to refute the Epicureans. Hale tried to demonstrate that man did not originate by chance, that nature and man were the creation of God, and not the result of growth out of some spontaneously generated beginning of life in ages past. Adding fuel to the discussion was the republishing and translation into English of Lucretius at the beginning of the eighteenth century.

In the middle of the century, all at once, the Epicurean teachings burst out in several important writers. In 1746 came Maupertuis' *Essai de cosmologie*, in the following year La Mettrie's *L'homme machine*, in 1749 the first volumes of Buffon's *Histoire naturelle générale et particulière*, and in the following year La Mettrie's *Système d'Epicure*, followed in 1754 by Maupertuis' *Système de la nature*. Each of these works to various extents suggests the origination of life out of matter by spontaneous generation, and the development of mankind out of lower forms through long periods of time. And it is chance rather than God which has done the creating.

#### *The "Vornehmsten Wahrheiten"*

This, the first of Reimarus' two important scientific works, followed hard on the heels of these Epicurean works in 1754, and is a defense of the traditional Creation doctrine against them. Its entire title is very explicit if grandiose: "The Principal Truths of Natural Religion Defended and Illustrated, in Nine Dissertations: Wherein the Objections of Lucretius, Buffon, Maupertuis, Rousseau, La Mettrie, and other ancient and modern Followers of Epicurus are considered, and their Doctrines refuted." The problems of the nine dissertations as he states them are not unusual for his age, his solutions to them not much advanced over Hale or Ray in the previous century, and his arguments are often assertions or labored "proofs" common to the period of the Enlightenment. What is interesting is the evidence which he marshals to make his points. In the first dissertation, for example, he argues that nature on earth is not of infinite origin, but has developed from something else, his evidence being the increase in population, decrease in forestation, the growth of civilization, and the fact that contemporary languages had to be thought of as growing out of some common source. This has a distinct eighteenth century ring.

The sixth dissertation is on the nature of man, how he is endowed with a single unitary soul that is like a pilot at the helm of the body alone conscious of what it

and the body suffer. He is here led into a Cartesian position by his antipathy to La Mettrie. Man is not a machine; thoughts are not simply the "counter-working" of the brain in response to sensations, since by such a view, the thought would have to be everywhere equal to the strength of the sensation; which we know is not true.

The seventh dissertation is an answer to J. J. Rousseau's famous eulogy of the state of nature, *Discours sur l'origine et les fondemens de l'inégalité parmi les hommes*.<sup>26</sup> Reimarus replies that man is made for knowledge, not liberty, and lists the superiorities of civilized man over animals. It is quite unremarkable, as are the eighth dissertation on the providence of God, and the ninth on the immortality of the soul and the advantages of religion.

It is the second through fifth dissertations presenting arguments against the evolutionary doctrines of the Epicureans which are of most interest. The main points are (a) that spontaneous generation is false, (b) that chance could not have put the world together out of atoms, and (c) that animal behavior, purposeful yet unlearned, is too carefully suiting the individual species in its habitat to be anything but the design of an all-intelligent God. We will take these up in turn.

#### *Spontaneous Generation*

Any theory of the evolution of life out of matter has to have some kind of 'spontaneous' generation to start it off. Nowadays, we think of clouds of dust and gas in space where hydrogen cyanide and other more complex organic molecules are synthesized. But the idea begins with Anaximander, has its own history through Greek and Roman writings, and was an essential ingredient of the Epicurean mix of ideas. Indeed, most people—even scientists such as Harvey—thought that maggots were spontaneously generated by decaying meat—a plausible belief in an age without a microscope. The problem was first attacked experimentally by F. Redi in 1668, who showed that meat had no maggots when kept covered, whereas meat left in the open crawled with them. The inference was that maggots hatched from flies' eggs. Twenty years later, A. van Leeuwenhoek, not knowing of Redi's experiments, did similar ones with similar conclusions. And the astonishing J. Swammerdam, in a remarkable anticipation of future discoveries, had urged the opposite, that decay in organic matter is produced by living organisms.

But these little known facts were no match for the enthusiasms of a new century: Sometime in the 1740's Maupertuis and the irrefragable Buffon had long and serious discussions about the problem. When the well known English Catholic divine and microscopist, John Turberville Needham came to Paris, he was immediately prevailed upon by the two elder Epicureans to begin experiments. Accordingly, Needham corked up in phials various broths such as "mutton gravy hot from the fire" or "wheat flour and clearest spring water" heated to kill off any "animalcules." And later,

... the very first Drop I used upon opening it yielded me Multitudes perfectly form'd animated, and spontaneous in all their Motions.<sup>27</sup>

<sup>26</sup>Jean Jacques Rousseau, *Discours sur l'origine et les fondemens de l'inégalité parmi les hommes*. Amsterdam: M. Rey, 1755.

<sup>27</sup>[John Turberville Needham], *An Account of some New Microscopical Discoveries*. London: Printed for F. Needham over against Grey's Inn in Holborn, 1745.

The experiments were so successful that they then moved from Needham's to Buffon's house where the broths could be examined several times daily by assistants. And even Buffon himself, who in this instance should have stuck to his "the more one observes, the less one reasons," was actually brought to observe something for himself. Though he never saw through the microscope all that Needham had, he certainly concurred, and gave the experiments a prominent place in his general introduction to the volumes on animals of his massive *Histoire naturelle* in 1749.<sup>28</sup>

Interestingly, the two men had differing theories. Needham insisted that there is "a real productive Force in Nature residing in every microscopical point," which was similar to Maupertuis' position. Buffon believed that life generated by the combining of organical machine-like parts "perhaps little more than elastic springs," which he thought had been microscopically observed.

At any rate, Reimarus correctly will have none of this. He describes this work in some detail, derides the fact that Buffon and Needham could not see the same things through the same microscope, questions their methods, and then describes extensively the work of Pieter van Muschenbroeck, the Dutch experimental physicist. Evidently, Reimarus had received the information by way of one of his friends, for he says "I am credibly informed" that Muschenbroeck took

... the very same substances that they did from the vegetable and animal kingdoms, and put them into glass vials; having first poured boiling water on them, that if any animalcules, or eggs or seed of animalcules, were in the substances, they might be destroyed by the heat. Afterwards he stopped the vials with glass stoppers carefully luted, so that no invisible animalcular seed should penetrate through it. A putrefaction of those substances indeed ensued; but the putrified substances being examined through a microscope on the eighth, ninth, tenth, and twentieth day, at different hours, nothing was found in the vials that had the least appearance of a living animal.<sup>29</sup>

The inability to prove spontaneous generation when proper precautions were taken was indeed a severe blow to evolutionary ideas. This is an ironic instance in the history of science when experimental truth is holding back more important theoretical truth.

But Reimarus had also been reading La Mettrie's *Système d'Epicure*,<sup>30</sup> a series of rhapsodic outbursts, in turns ribald and serious. How the irresponsible and giggling La Mettrie must have dismayed the earnest and sincere Reimarus! With glee and abandon, La Mettrie describes the life of man as being like soap bubbles blown by children, praises sexual pleasure as man's highest good, recounts the traditional Anaximandrian story of life being generated from a primordial slime, and of a world created by chance and confusion rather than by wisdom and design. And perhaps knowing of Redi or Swammerdam, he suggests that the earth is old

<sup>28</sup>Georges-Louis Leclerc de Buffon, *Histoire naturelle générale et particulière avec la Description du Cabinet du Roy* (Paris: Imprimerie Royale, 1749), 2, 53-73. Cf. *Oeuvres philosophiques de Buffon* (Paris: Presses Universitaires de France, 1954), 256.

<sup>29</sup>H. S. Reimarus, *The Principal Truths of Natural Religion*, trans. by R. Wynne (London: B. Law, 1766), 70-71.

<sup>30</sup>Julien Offrey de La Mettrie, "Système d'Epicure," "Abrégé d'un système," "Traité de l'ame," in *Oeuvres philosophiques de Monsieur de la Mettrie*. Amsterdam: 1753. Reimarus refers to all three.

and tired and is no longer able to spontaneously generate life. An undisputable out! In answering La Mettrie, Reimarus could only point to the vagueness with which the Epicureans described this process, the answers to such questions being, of course, far off in the next century when the problems of inheritance and genetics would be understood.

#### Chance or God?

La Mettrie had also, of course, insisted that it was chance operating over a huge span of time that accounted for the world as we know it. But no one really had to take him seriously and few of his contemporaries did. Yet the famous astronomer and mathematician who had introduced Newton to the Continent, Pierre Louis-Moreau de Maupertuis, was quite another thing. Usually residing at the court of Frederick II in Berlin and its most popular and respected scientist, he had in 1746 written his *Essai de cosmologie*<sup>31</sup> which had placed him in the Epicurean camp. But he was very far from the joyous Godlessness of a La Mettrie. In fact, both Maupertuis and Reimarus are astonishingly alike in their basic scientific motive. For both, there was one basic question: how do we discover evidence of Supreme Being in the observable phenomena of nature?

For Maupertuis, God revealed Himself not in the meaningless variety of phenomena, but in the great natural laws behind these phenomena, such as his own recently announced Law of Least Action (two bodies coming into contact move so as to require the least strength or quantity of "action"). Reimarus doubted that uniformities, particularly in the inanimate world, could ever give proof of a primary, self-existent Being. For Reimarus, as for Newton (whom Maupertuis had mocked in this particular), the uniformities were not sufficient evidence; it was in the variety of forms, each so well suited for its own particular existence, the "order and harmony" of the world, and not simply its "order and conformity," that God revealed his authorship of the universe.

Maupertuis was well known for keeping in his Berlin apartments many different kinds of animals, including deer, dogs, monkeys, and birds. With Epicurean hypotheses in mind, he constantly tried to mate animals of widely different species to show that this could have been the origin of existing species. As a result of these studies, he published in 1754 the article previously referred to. Its full title is *Système de la nature: Essai sur la formation des corps organisés*.<sup>32</sup> This work shows even more his Leibnizian tendencies when he posits that all material particles have psychic properties, and in this way life as we know it could be evolved from matter. New species are formed by chance, and the chance changes in the particles of the new species make them unable to breed with other species.

Reimarus' answer to Maupertuis amounts to little more than an assertion of his own beliefs, that the world is so intricately made, that nothing but an all-wise creator could have brought it into being, and that what the Epicureans called chance is really divine action. He notes that the body of an animal "is compounded of millions of particles of a different nature, a constitution which infinitely surpasses

<sup>31</sup>Pierre Louis Moreau de Maupertuis, "Essai de cosmologie, où l'on examine les preuves de l'existence de Dieu, tirées des Merveilles de la nature", in *Les œuvres de Mr. de Maupertuis* (Dresden: G. C. Walther, 1752), 14-25. Cf. Reimarus, *The Principal Truths*, 165-188.

<sup>32</sup>P. L. M. de Maupertuis, *Système de la nature: Essai sur la formation des corps organisés*. Berlin & Paris, 1754.

all the invention, skill, understanding, and wisdom of man."<sup>33</sup> And to consider that such a multitude of various particles could be put together by blind chance is like considering that Virgil's Aeneid could be put together by chance collections of letters taken at random from a printer's case.

In all this, there is no doubt that Reimarus feels himself standing up on the side of goodness and light. From our point of view, however, it is all quite reactionary, for the Epicureans were pointing directly to the biological discoveries of the nineteenth century. One can wonder indeed why, if a man like Reimarus could be so radical a thinker in religion as his "Apologie" is witness, he could not have thought more daringly in matters of biology. The answer is that it was the strength of his radical religious beliefs that was behind his biological interests. And as they led him to be on the wrong side of the question in regard to evolution, they also led him to be the most advanced thinker of his time in animal behavior. It is in the fifth dissertation that we see the beginnings of what six years later becomes his major contribution to intellectual history.

#### Animal Instincts

Feeling in the preceding dissertations that he had demonstrated the argument for design in other realms, Reimarus here proposes to survey the animal kingdom for exactly the same purpose that John Ray had done so a half-century earlier, namely to show the wisdom of God in animal behavior. He defines instincts or drives (he uses *Instinkt* and *Trieb* interchangeably<sup>34</sup>) in the customary way, discussing their purposes and uses in preserving animal species, and he surveys them sporadically and haphazardly through the animal kingdom, quoting from Ray, Willughby, Réaumur, Bonnet, Swammerdam, Derham, Guér, Lesser, Klein, LaMettrie and others,<sup>35</sup> and Buffon when he can chastize him for his inaccuracies. All arguments begin with divine wisdom instead of concluding with it. Reimarus is impressed with the "thousand untutored skills" that animals have for the support of themselves and their species. These skills are God's thoughts which He

has implanted in their natures . . . for their welfare, that even from their first production, they are able to practice them, though blindly, yet without ever committing any mistake.<sup>36</sup>

In this passage and in the following, Reimarus is defining instinct in the usual way, namely that it appears relatively perfect at its first occasion, without practice, and without knowledge of its purpose.

<sup>33</sup>Reimarus, *The Principal Truths*, 76.

<sup>34</sup>*Ibid.*, 216-7.

<sup>35</sup>*Ibid.*, Dissertation V: John Ray (1627-1705), *l'Existence et la sagesse de Dieu manifestée dans les œuvres de la Création*. Utrecht: C. Broedelet, 1714; Francis Willughby (1637-1672), *Ornithologia*. London: J. Martyn, 1676; René Antoine Ferchault de Réaumur (1683-1757), *Mémoires pour servir à l'histoire des insectes*. Paris: Imprimerie Royale, 1734-1742, 5 vols.; Charles Bonnet (1720-1793), *Traité d'insectologie*. Paris: Durant, 1745; Jan Swammerdam (1637-1680), *Bybel der natuure, of Historie der insecten*, with Latin trans. by H. D. Gaubius, *Biblia naturae, sive Historia insectorum*. Leyden: I. Severinus, 1737-8, 3 vols.; William Derham (1657-1735), *Physico-Theology*. London: W. Innys, 11 eds., 1712-1745<sup>11</sup>; Jean Antoine Guér (1713-1764), *Histoire critique des bêtes*. Amsterdam: F. Changuion, 1749; Friedrich Christian Lesser (1692-1754), *Insecto-Theologica*. Frankfurt & Leipzig: M. Blochberger, 1740<sup>2</sup>; Jacob Theodor Klein (1685-1759), *Quadrupedum dispositio brevisque historia naturalis*. Leipzig: J. Schmidt, 1751; J. O. de LaMettrie (1709-1751), *l'Homme plante in Oeuvres philosophiques, op. cit.*, 2.

<sup>36</sup>Reimarus, *The Principal Truths*, 216.

Thus in animals which do not partake of reason, we perceive a certain natural impulse (*Trieb*), instinct, or skill, by which they perform in a masterly manner, all that the most perfect reason could suggest to them for the welfare of each species; and this by an innate and prompt dexterity, without any deliberation, trial, or experience; without any instruction, model, or pattern.<sup>37</sup>

Nothing could be more blatantly opposed to the whole spirit of the Enlightenment. And the examples given include the silkworm spinning its "soft coque or bed," bees constructing their cells in which he quotes Réaumur, fishes hatching and feeding their young after migrating far up the river, the spider who

no sooner out of the egg than it begins to spin a web, which it had never seen, or learned, or made before, and without the least experimental knowledge that there are flies and gnats in the world for its aliment, and which may be taken in that flight and delicate tissue.<sup>38</sup>

Of wild goats and chamois leaping among craggy rocks, Reimarus rhetorically asks,

Who has taught these animals to measure the distances with their eye, that they may not leap too short or too far? Who has instructed them to throw themselves backward with a swing that seems unnatural, and to preserve the balance of their bodies in such amazing leaps? Who inspired them with such intrepidity as to fear no depth or fall, who immediately, at the beginning of their existence, to rely for safety on an art which they never practiced before?<sup>39</sup>

He quotes extensively J. A. Roesel von Rosenhof's observations of butterflies, moths, beetles and other insects.<sup>40</sup> He describes the nautilus putting out its membrane as a sail and instincts for acquiring foods, for migrations, instincts involved in the balance of nature by which the population of a species is kept approximately constant, instincts of birds of prey where he quotes the American naturalist Mark Catesby's observations,<sup>41</sup> the mating instincts, and instincts by which a member of each species recognizes another member of that species as well as the opposite sex. The value of his survey historically is in the knowledge of behavior behind his questions.

How is it that the young female nightingale knows the voice of her mate among all the various warblings of the inhabitants of the wood? and how comes it, that other birds of different species are not charmed by its melody . . . ?<sup>42</sup>

How indeed if one is a straight empiricist?

<sup>37</sup>*Ibid.*, 216-7. Reimarus has not yet made the distinction between *Trieb* as a spontaneous inner force (*treibende Kraft*) and *Kunsttrieb* as a goal-directed activity, hence we follow Wynne's translation of *Trieb* as 'impulse'. Cf. Jacob and Wilhelm Grimm, *Deutsches Wörterbuch*, 32 vols. (Leipzig: S. Hirzel, 1952f [1854f]), 22, 446-7.

<sup>38</sup>*Ibid.*, 231.

<sup>39</sup>*Ibid.*, 244.

<sup>40</sup>August Roesel von Rosenhof (1705-1759), *Die monatlich herausgegebenen Insecten-Belustigung*. Nürnberg: J. J. Fleishmann, 1746-1761, 4 vols.

<sup>41</sup>Mark Catesby (1679-1749), *The Natural History of Carolina, Florida, and the Bahama Islands/Histoire naturelle de la Caroline, la Floride et les Isles Bahama*. London: the author, 1731-43, 2 vols.

<sup>42</sup>Reimarus, *The Principal Truths*, 273.

So far Reimarus has said nothing about animal behavior that is completely new. What is original are his emphases and his syntheses of previous arguments and material with his own special enthusiasm, and lining it all up against the empiricist position. And the placing in the center of his principles the chapter on animal behavior drew attention to the problem of innate behavior as none of the major figures of the Enlightenment were doing or were able to do. The real issue was: What were these instincts or drives? The question was extremely important, since the empiricists were everywhere maintaining that no such inherited patterning of behavior existed.

To this end, Reimarus, feeling he had vanquished the Epicureans, now turned to the empiricists. He expanded the fifth dissertation of the *Vornehmsten Wahrheiten* into his *Triebe der Thiere* five years later. The intellectual leap between the two works is even like that of his chamois among the rocks and is remarkable for the eighteenth century. The word instinct is given up in favor of drive. God is moved back a little. Drives are brought forward, and classified into an entire theory of behavior: mechanical drives by which he means reflexes, awareness drives in which he analyses consciousness in a way that Wundt<sup>43</sup> may have found essential one hundred years later, approach-avoidance drives identical with current behavioral theory, and the skill drives, comprising what current ethologists refer to often with less sophistication as instincts. And Reimarus' *Triebe* are at the basis of the whole line of development that leads from German Romanticism to Freud and McDougall. This work is of such importance that it will be the subject of Part II.<sup>44</sup>

<sup>43</sup>Wilhelm Wundt, *Vorlesungen über die Menschen- und Thierseele* (Leipzig & Hamburg: L. Voss, 1863), I, 490.

<sup>44</sup>J. Jaynes and W. Woodward, "In the Shadow of the Enlightenment: II. Reimarus and his Theory of Drives", *Journal of the History of the Behavioral Sciences*, 1974, in press.