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The Earliest Reference to ADHD in the Medical Literature? Melchior Adam Weikard's Description in 1775 of "Attention Deficit" (Mangel der Aufmerksamkeit, Attentio Volubilis)

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Abstract

Objective: The present article reports on the discovery and translation of a chapter in a 1775 medical textbook by the German physician, Melchior Adam Weikard, which describes attention disorders. This article is believed to be the earliest reference to the syndrome that today is known as attention deficit hyperactivity disorder, or ADHD. **Method:** The authors briefly discuss previous efforts to identify the earliest description of ADHD thought to be the lectures of George Still in 1902 and subsequently, the medical textbook by the physician, Alexander Crichton, in 1798. Background is provided on Weikard followed by the English translation of his short chapter on attention deficits and the rationale for why it should be viewed as relevant to the history of ADHD. **Results and Conclusions:** The authors argue that Weikard's description in 1775 now deserves to be credited with providing the first description of attention disorders in the medical literature known to date. *(J. of Att. Dis. 2011; XX(X) 1-XX)*

Keywords

ADD/ADHD, ADHD, adult, adult ADHD, history of ADHD, inattention

Among the first references to a hyperactive child (Fidgety Phil) in any literature was typically said to be in the poems of the German physician Heinrich Hoffman in 1865, who penned poems about many of the childhood maladies he saw in his medical practice (Stewart, 1970). But for decades, scientific credit has typically been awarded to the British physician George Still (1902) for being the first author to describe the behavioral condition in children that most closely approximates what is today known as ADHD. Since the 1970s, authors discussing the history of ADHD within the medical or psychiatric literature (Accardo & Blondis, 2000; Barkley, 1990, 2006; Goldstein & Goldstein, 1998; Kessler, 1980; Ross & Ross, 1976; Schachar, 1986; Werry, 1992) repeatedly cited the three lectures by Still published in the *Lancet* as probably being the first known discussion of a psychiatric syndrome comparable with what today is diagnosed as ADHD.

Still (1902) described 43 children in his clinical practice who had serious problems with sustained attention, consistent with the view of William James (1890) that this form of attention was an important element in the moral control of behavior. Most of Still's cases were reported to be quite overactive. Many were characterized as aggressive, defiant, resistant to discipline, and excessively emotional or "passionate" and all showed little "inhibitory volition" over their behavior. Still proposed that the immediate gratification of the self was a "keynote" quality of these and other attributes of the children. Among all the features he described, passion (or heightened emotionality) was the most common and noteworthy attribute. Still believed that these children displayed a major "defect in moral control" in their behavior that was relatively chronic in most cases. By such a defect, Still meant "the control of action in conformity with the idea of the good of all" (p. 1008). Moral control was thought to arise out of a cognitive or conscious comparison of the individual's volitional activity with that of the good of all; a

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comparison he termed *moral consciousness*. This defect in moral control could arise as a function of three distinct impairments: a "(1) defect of cognitive relation to the environment; (2) defect of moral consciousness; and (3) defect in inhibitory volition" (Still, 1902, p. 1011). He placed these impairments in a hierarchical relation to each other in the order shown, arguing that impairments in lower levels would affect those levels above it and ultimately the moral control of behavior.

But in 2001, Palmer & Finger asserted that the initial description of a disorder resembling ADHD ought to be assigned to the Scottish-born physician Alexander Crichton. He had published a chapter on disorders of attention in the volume of his medical textbook dealing with an inquiry into the nature of mental disorders published in 1798 (Crichton, 1798). Crichton's description predated Still's work in this area by another 104 years, pushing back the history of ADHD to a remarkably earlier time. While it is clear that Still was aware of earlier papers, particularly on primates, concerning the behavioral symptoms of injuries to the brain, which resembled those of ADHD, no reference to Crichton's chapter is evident in any of Still's three lectures. Crichton portrays attention in the following ways. First, it was the central feature of one's awareness; it is what we have chosen to concentrate our mind on, at least for the moment, be it an external stimulus or internal thought. Second, attention was seen to be effortful, not automatic. Crichton saw attention as requiring that we actively initiate the action of concentrating our attention on something. Third, attention was seen as being a volitional or willful activity. Although it may be precipitated by some motive or goal in the service of which it is being deployed, it was seen as still being an active choice by the individual. Those things of interest to any person and that become the object of their attention may well be influenced by previously innate and acquired motivations, but a choice still remains in electing to focus the mind on this object rather than on many other alternatives. This freedom of choice among available alternatives is what many philosophers have construed as representing free will, which more clearly means freedom to choose.

Still and Crichton observed that disorders of attention can arise as a result of either a person being born with such a problem by which Crichton likely meant heredity or by accidental diseases affecting the nerves and brain to which the person has been exposed. Even peripheral disorders of the body could, in Crichton's view, diminish nerve sensations enough to affect the capacity to attend to them. Neither Crichton or Still argued for an entirely social cause for disorders of attention. However, Crichton discussed the possibility that early education of children can serve to enhance or retard their natural powers of attention depending on how they are educated and whether it is tailored to individual variation in what interests them. Crichton noted that problems with attention were associated with many other mental and physical disorders. He also considered attention to consist of different components. He singled out inconstancy of attention as one such component. By this he seems to have meant the inability to sustain one's attention for an adequate period toward a particular object of attention resulting in people skipping across various things to which they are attending spending little time with each. This likely resembles the modern concepts of sustained attention and resistance to distractibility. His second component of inattention involved the energy or power of the capacity to attend. This seems to parallel modern notions of arousal and alertness because Crichton felt that attention could become fatigued or be affected by inadequate mental energy. Such mental energy could be adversely affected not only by diseases or other injuries to the brain but also by either underuse or excessive use of one's faculty of attention. Thus, Palmer and Finger (2001) made a persuasive case for Crichton's discussion of disorders of attention as likely being the first reference to an ADHD-like disorder in the medical literature; at least until now.

Background

In August of 2011, Barkley received an email from John Gould, a pharmacist working in Brisbane, Australia, who described himself as having a keen interest in the history of psychiatry. Gould wrote that he had been reading *A History of Madness* by the French philosopher Michel Foucault, in which he came across a reference to a medical textbook by the prominent German physician Melchior Adam Weikard, titled *Der Philosophische Arzt*, which was published in 1790, 8 years before Crichton's textbook. Weikard's textbook was said to contain a chapter on attention deficits (*attentio volubilis*) within a larger section on "Sicknesses of the Spirit" (*Geisteskrankheiten*). Gould believed that this chapter may deserve credit as being the first medical description of ADHD. A problem arose in making such a determination, however, in that no English translation of the chapter apparently existed that could be used to compare the Weikard chapter to modern descriptions of the disorder. Barkley was able to track down a reference to the textbook on the Internet through Google and even its original copy in German. He then contacted Peters in Germany for his assistance in getting the relevant section of this text translated into English. Peters also bought a specimen of the second edition published in 1785. The original German version of the section on attentio volubilis was first published in 1775. Peters has done the translation of this section. As will become evident the chapter clearly has historical relevance in any discussion

of the history of disorders of attention in medicine (psychiatry). But first, we provide some background about Melchior Adam Weikard.

Melchior Adam Weikard (1742-1803)

According to a biography published in 1970 by Otto M. Schmitt, Weikard began his medical career as a spa doctor in Fulda, Germany. We found other information about Weikard in the German version of Deutsche Biographe,[1] Wikipedia,[2] and Wikisource.[3] From these various sources, one learns that Weikard was born on April 27th in 1742 in Romershag (near Bruckenau) and died on July 25th, 1803. He was the son of an innkeeper (landlord). Due to an accident, he had a deformed spine resulting in a small stature. He attended secondary school at the Frobenius-Gymnasium in Hammelburg apparently studying in the scientific-technical sector of the school. In his autobiography, he noted that he was nearsighted, physically deformed, and socially inept (as reported in a dissertation by Ruth Dawson[4]). He went on to study physics, philosophy, and medicine in Wurzburg and graduated in 1763. Weikard began his practice as a physician in Fulda, a Catholic town, eventually rising in prominence to become physician to Prince-Bishop Heinrich von Bibra. He also eventually earned the rank of Professor of Medicine. He worked as a physician at a government-run resort spa in the Office Bruckenau from 1764 to 1776.[5] In 1784, he was appointed to the position of court physician to the Russian Empress, Catherine II, at the imperial court in St. Petersburg. By 1785, he was appointed to State Council there and served in that capacity until 1789. Then, from 1791 to 1792, he served as physician to Prince-Bishop Karl Theodor von Dalberg of Mainz. After retiring from this position, he practiced medicine in Mannheim and Heilbronn and, at times, also served as a physician to Tsar Paul in St. Petersburg, Russia. Incidentally, he is also the father of the novelist Marianne Sophie Weikard (1770-1823).

Weikard published numerous works on medical topics as well as on philosophy and psychology. He is described as a supporter of the excitability theory of John Brown as an initial scientific basis for the practice of medicine. Weikard was instrumental in getting Brown's book, *Elementa Medicinae*, published in a German translation in 1795.[6] He was also supportive of the association school of psychology. As noted by his biographer Schmitt (1970), Weikard was a *polyscribent*—he wrote down his inspirations. His philosophical contemplations were considered revolutionary at that time. As an outstanding connoisseur of antique and contemporary literature (philosophy, naturopathy, medicine, etc.), he presented numerous anecdotes and examples of maladies and their cures due to his exorbitant erudition, unemotional approach, clinical experience, and impartial comprehension. Many times he attacked his medical adversaries and backward theologians by brilliant but vicious side blows. In the first part of his medical textbook, Weikard discusses the influence of the body on the psyche that is quite reminiscent of the psychoanalytical theory of Freud and modern psychotherapy. He did not view diseases as being distinct (as he did in his later medical works), instead viewing the whole personality, whether healthy or ill, in the sense of a more general psychology or that of a philosophical doctor trying to understand, as Schmitt put it, how the animal machine was set into action. As a physician, Weikard took a skeptical position on seemingly scientific views of his time. His combination of scientific precision with unusual objectivity and factual-based observation was a vanguard for his time. Seen from today, he explored the deep connections between physical illness and their psychological causes. Many of his descriptions of human character about desires, ambition, mistrust, anger, greed, jealousy, hatred, pride, and envy, and their psychological backgrounds, might today still be considered valid.

As will become important in the following, Weikard did not esteem astrology that was so popular at the time. It was believed in those days of superstition that the influence of good or evil star constellations was important for the conception or birth of people, whether the child was determined to be a funny, silly or sensible, happy or unhappy, and strong or weak global citizen. While he expressed belief in a God, he had a highly critical opinion about the church, mainly due to the widely existing and promoted religious beliefs in witchcraft and in exorcisms associated with the silliest ceremonies as Schmitt reported. In later years, Weikard was openly hostile to religion and the church, even refusing to receive the sacraments on his deathbed.

The first edition of Weikard's textbook *Der Philosophische Arzt* was first published in 1775, but perhaps as early as 1770. Wikipedia cites the original publication as being 1773-1775. We were able to confirm the 1775 publication date through an original copy obtained by Peters. The initial textbook was published anonymously. So was the second edition. Yet it was widely believed that Weikard was the author.

The reason for the anonymous publishing of the work is unclear but, as noted earlier, was probably due to anticipated critical reactions to its publication from several sources. One of these sources was probably the Prince-Bishop of Fulda to whom Weikard served as physician and in the Catholic locality of which Weikard was working as a spa doctor and supported by the state. If this was the motivation, Weikard was right to be concerned. According to Schmitt's (1970) biography of Weikard, the reaction of organized religion to the publication of his textbook was widespread condemnation owing to his attacks in the textbook on various religious practices being used at the time to cure medical

illnesses. From the pulpit, it was orated, "Is there no thunderbolt left in the sky, in order come down and slam this creature into the ground?" In all churches, it was preached that Weikard was being the free spirit. Schmitt commented that this was a witch hunt Fulda had never experienced before. Weikard was defamed, and his friends were afraid to visit him or even just to sit next to him. Even those people were persecuted who once had close relationships with him. Those who did not act against him were called free spirits and godless. Other friends and acquaintances wept over his poor soul. According to Schmitt, the wife of a university colleague, who saw what Weikard's book caused, remarked in a touching spiritual ignorance, "I am so glad that my husband is unable to write!"

It is understandable that the Church and especially the religious societies with their outdated medieval opinions (expulsion, witchcraft, exorcism, etc.) would fight him, according to Schmitt. But the medical establishment of the time also raged against him. Every medical journal and nearly all German journals trashed the author and his book as described by Schmitt. Yet as Schmitt noted, the enlightened part of the audience was unimpressed by this campaign and all of the angry personal attacks were in vain as Weikard's textbook would go on to four to six editions. For whatever reason, it was not until the third edition of this medical textbook published in 1790 that Weikard's name appears on the volume as its author.[7] The attacks against Weikard continued throughout his career. Yet his patron, Prince Heinrich von Bibra, maintained an amicable relationship with Weikard, even though many agitated against the Prince for doing so. His public response to such agitation was to issue a decree prohibiting the possession of the textbook at a penalty of 50 thalers, but he did nothing against Weikard personally and even supported him financially during his retirement (Schmitt, 1970).

An interesting question that arises from this discovery of the Weikard text and from what is known about Alexander Crichton is whether they knew each other. Crichton visited Germany during the interval 1785 to 1789 for training, including in two of the cities in which Weikard had been in practice (Stuttgart and Halle; see Wikipedia for Alexander Crichton). After returning to England, Crichton set up a school of medicine in 1791 modeled on those he had visited while in Germany (Palmer & Finger, 2001). Although we could find no record of it, it is very likely that the two would have met during this period given Weikard's prominence in the field of medicine in Germany and his practicing in two of the cities where Crichton was studying medicine. Certainly Crichton would have known of Weikard's medical textbook as it had been published and was highly influential in the practice of German medicine before and during the time Crichton studied in Germany. Weikard also would have later known of Crichton's 1798 textbook as it was published in Germany the same year it appeared in London. He also cited some of Crichton's published work in German in a later 1799 edition of his own medical handbook, as noted in medical textbooks published by Professor Hecker in 1813[8] and Jahn in 1815.[9] It may also be more than coincidence that Crichton would go on as well to be a consulting physician to the royal court in Russia in 1803 around the time of Weikard's death; perhaps Weikard may have arranged for Crichton's replacement in that role? The influence of the two physicians on each other therefore may eventually have been reciprocal. Yet Crichton goes to great pains in his 1798 textbook to note that he is among the first to approach the study of mental disorders from a physiological or medical orientation, as discussed by Palmer and Finger (2001). For example, Crichton (1798) said,

> If we except Dr. Arnold of Leicester, no other author of this country has written fully on the subject of Mental Diseases. Monsieur DuFour Is the only author, since the time of Sauvages, who has written systematically on them in France; and although the German press has sent forth a vast number of publications which related to diseases of the human mind, yet they are only collections of cases, histories of individual diseases, or accounts of new remedies; for no author of that learned nation . . . has written either fully or systematically on *Vesaniae*. (pp. ii-iii)

As we hope to show in the following, this was not the case. Weikard had done so, at least for attention deficits, providing more than just a description of a single case. Certainly, Crichton's chapter in his textbook on attention and its diseases is much longer and hence, a more detailed and in-depth discussion of attention deficits than that written by Weikard (46 pages vs. 5.5, respectively) some 24 years earlier. And Crichton's entire treatise on mental disorders in his *Inquiry* is a far broader and more systematic description of mental disorders and their causes than was undertaken by Weikard. But in this instance where we focus on the history of deficits in attention within the medical literature, Weikard's chapter on the topic cannot be easily dismissed as irrelevant.

In any such historical account, it is noteworthy that the publication of Crichton's textbook occurred 24 to 28 years after Weikard's chapter on attention deficits. Even if we discount the two earlier anonymous editions as being authored by Weikard, the third edition was published under Weikard's name 8 years before Crichton's own book. Also worth noting is that Crichton did not even conclude his studies in medicine in Leyden (the Netherlands) until 1785, well after Weikard's medical textbook was initially published in 1770 to 1775. We believe that this temporal ordering of Weikard's textbook appearing 24 to 28 years before Crichton's further supports our contention that Weikard actually deserves priority over Crichton as the first person

to publish on the topic of attention deficits in the medical literature.

With this as background, we now present the English translation created by Dr. Peters of Weikard's discussion of attention deficit from the original.[10]

3rd Chapter

Lack of Attention, Attentio Volubilis

1. Description of the illness. Those, who have a lack of attention, are generally characterised as unwary, careless, flighty and bacchanal.

An attentive person has to concentrate on his topic for a longer time and more insistent than others. However, it takes a certain stability and strength of the fibres when they are supposed to maintain [persevere] a constant effect on the topic. The fibres have to be able to take the namely atmosphere or tension for a longer time than usual. They must not be bewildered or affected by any clamour or by any disturbance caused by their mobile neighbours. It is soon to be perceived that this is the case with soft, easily agile or very irritable fibres, where a slight sensation of any minor matter causes brief side associations and participation of adjacent fibres. Like children, who are distracted by a hundred minor matters, when they are perused or conversed with about a serious matter. A young chaplain for example is supposed to meditate about the saviour's sufferings. Every humming fly, every shadow, every sound, the memory of old stories will draw him off his task to other imaginations. Even his imagination, if and when it is copious, entertains him with a thousand minor subjects. He laughs so cordially when he is contemplating a nun who saw a soldier getting caught on the fence of the garden and his trousers getting snagged while he is to meditate on when Christ was taken prisoner. – That is what I call lack of attention.

2. Coincidences and features. An inattentive person won't remark anything but will be shallow everywhere. He studies his matters only superficially; his judgements are erroneous and he misconceives the worth of things because he does not spend enough time and patience to search a matter individually or by the piece with the adequate accuracy. Such people only hear half of everything; they memorize or inform only half of it or do it in a messy manner. According to a proverb they generally know a little bit of all and nothing of the whole. Compared to an attentive and considerate person such a jumpy person may act like a young Frenchman does in comparison to a mature Englishman. In science he lacks thoroughness, punctual accuracy and correctness. People of his type are the hussars[11] in the republic of pundits. They are mostly reckless, often copious considering imprudent projects, but they are also most inconstant in execution. They treat everything in a light manner since they are not attentive enough to feel denigration or disadvantages.

3. Causes. When children are taught a hundred things at the same time, when they are not given enough time, or when they do not get into the habit of examining things partially; thus the flaw of inattention develops. The rage to read everything, to learn everything will cause occasion hereto. A soft lifestyle can make the fibres too soft and too agile and can also cause the fact that they lack the necessary strength for the constant attention, that every sensory nerve and every cerebral fibre is shaken too quickly and thus causing distraction. Stiff, immobile fibres are not strenuous neither for thinking nor for attending. The lonely, the deaf, the blind and everybody else, who is surrounded by the fewest items (provided that there is no indecent constitution in the delicate brain or in the delicate nerves) will be the most skilful person in order to give doughty attention to a matter. Contrary noise, manifoldness etc. derogate. A dull inactivity of the fibers can lead to inefficient sensations and perception, and also be inefficient for attention, because they are rarely moved actively enough, or because a case was rarely seen as important enough.

4. Examples and experiences. The Duke of Buckingham said about King Carl II "that his mind was quick and vibrant considering trifles and that he would sway himself high enough with important issues when he was able to keep his mind in a certain height with the help of constant attention." Socrates said: we would be able to understand the most difficult issues easily and fully, if we were able to imagine the same on our own and if we would not be distracted by any other ideas. Franz Vieta, the strongest algebraist, was supposed to explain to his king the most secret and most incomprehensible charts of the Spanish king. He did not eat and drink anything for some days, he did not hear and see anything and he only concentrated on his task until he finally and joyfully leaped into the air and was able to solve everything. – The youth is less attentive than the old; the girl less than the man; a sanguine person less than a choleric or a melancholic person; the French less than the English. Isn't the difference based in the conformation of the fibres and in the composition of the juices? A stronger effect of a constant attention was also noticed in former times than it is in our times. So, shouldn't the education, the prolific writing mania, the polymaths be an obstacle? We pay more attention to things we like and to things that affect our senses more powerfully. A teacher will be able to call his pupils' attention more easily when his voice is conspicuous, when his lecture is lively and full of pleasant ideas. We will read a book more attentively when there are passages, which have an influence on our handcraft or our interest.

5. Art of curing [Treatment]. The inattentive person is to be separated from the noise or any other objects; he is to be kept solitary, in the dark, when he is too active. The easily agile fibres are to be fixated by rubbing, cold baths, steel

powder, cinchona,[12] mineral waters, horseback riding, and gymnastic exercises. The youth is not to be lavished with manifoldness pursuant to the proverb: *Pluribus intentus minor est ad singula sensus.* He has to be kept with an object as long as it takes him to analyse it to the most punctual. He needs to comprehend the interesting in the analysis. The things are shown to him in a way that his interest or his self-love is pleased. When the reason is an excessive mercuriality, warm up his juices and the elasticity of irritable fibres: the ideal methods will be cold baths, milk, sour water, pure cinchona, acids, abstinence of coffee, spices, hot drinks, heating passions and others. Silence, loneliness, composure are of multiple use. One reads what is written considering an excitable temperament in this book. In case of inactive floppiness or ineffectiveness of the fibres fugitive, fervid and recuperative drugs are to be given. You can read about the stolid and clumsy temper.

Commentary

We believe that a careful reading of Weikard's chapter clearly shows considerable overlap with the nature of the attention problems believed to exist in ADHD as it is currently conceptualized. This is especially regarding the attention symptoms used in its diagnosis (American Psychiatric Association, 2000). For instance, distractibility has been a hallmark symptom of the disorder since its modern inception as the hyperactive child syndrome (Cantwell, 1975; Stewart, 1970) or hyperkinetic reaction of childhood in *Diagnostic and Statistical Manual of Mental Disorders* (2nd ed.; *DSM-II*; American Psychiatric Association, 1968). It is obvious that the first paragraphs of Weikard's discussion focus on just this feature of the attention deficit, which he explicitly notes later in the paragraph on Causes. His next paragraph dealing with Coincidences and Features describes quite well that the symptom of ADHD "often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities" (American Psychiatric Association, 2000). The "messy manner" with which they memorize or inform seems to us to be consistent with the symptom of "often has difficulty organizing tasks and activities." Moreover, the description of inattentive people as being "most inconstant in execution" and as not spending "enough time and patience to search a matter individually or by the piece with adequate accuracy" given by Weikard appears to us to be quite close to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*) symptoms of "often has difficulty sustaining attention in tasks or play activities" and "often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort." There is even a suggestion of problems with poor inhibition in Weikard's discussion that appears to us to be similar to those characterizing ADHD. He appears to be suggesting that inattentive people do not give due consideration to their "imprudent projects" and that they are impatient.

In his discussion of causes, Weikard clearly identifies poor upbringing or child rearing as the source of the attention deficit. This belief was widespread up through the 1970s and is even still commonly held today among laypeople. Yet even here he resorts to discussing the neurological impact of such poor upbringing, as when it makes "the fibers too soft or too agile and can also cause the fact that they lack the necessary strength for the constant attention." Similarly, in the paragraph on Examples and Experiences he notes that differences in concentration or attention are "based in the conformation of the fibres and in the composition of the juices."

Anticipating later findings in the modern scientific literature on ADHD, Weikard noted that inattention is more common in youth than in older people. Yet he also believed that women were less attentive than men, which has clearly proved not to be the case. He also believed that people were more attentive in earlier times and less attentive in his time, a lament we hear in the trade media even today. As for treating the attention deficit, Weikard was centuries ahead of his time in recommending that they be placed in distraction-free environments "separated from the noise or any other objects" that may be distracting. Yet he also discusses placing them in solitary or in the dark when they have become too active, which today would be considered inhumane if not unethical. His other recommendations for curing the attention deficit are, of course, ridiculous when viewed from our current and better scientifically informed perspective, such as using cold baths, sour milk, steel powder, and horseback riding. But his mention of exercises (gymnastics, horseback riding) may not be too far off the mark when considering that some modern research does support the use of physical exercise as a means of temporarily reducing the symptoms of ADHD (Allison, Faith, & Franklin, 1995; Bass, 1985; Tantillo, Kesick, Hynd, & Dishman, 2002). Regardless, the point here is not to scientifically critique Weikard's commentary on attention deficit from the 20/20 hindsight or vantage point of more than 240 years of subsequent research. It is to see if Weikard's description of attention deficit is comparable with the symptoms we would recognize today as representing the inattention that characterizes ADHD. We believe that sufficient evidence does exist within Weikard's chapter on attention deficit to qualify it as the earliest known description of ADHD, or attention deficit disorder (ADD), in the medical literature discovered to date.

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Notes

1. Retrieved from http://www.deutsche-biographie.de/pnd118841866.html?anchor=adb
2. Retrieved from http://de.wikipedia.org/wiki/Melchior_Adam_Weikard
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10. Retrieved from http://books.google.com/books?id=ZYIjAAAAcAAJ&printsec=frontcover&hl=de&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
11. A hussar is a light cavalry often used for raiding or piracy, typically having a reputation as being unruly, hard drinking, hard swearing, womanizing, moustachioed, swashbucklers, brave, daring, and conceited but not very intelligent (Wikipedia.org).
12. A large shrub or small tree that is native to South America. The bark of the tree is medicinally active and contains a variety of alkaloids, including the antimalarial compound, quinine, and the antiarrhythmic, quinidine (http://En.Wikipedia.org/wiki/Cinchona).

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