



Frontispiece. CARL ADOLPH AGARDH (1785–1859).

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CARL ADOLPH AGARDH. Professor, Bishop A Translation of J. E. ARESCHOUG'S 1870 Memorial¹⁾²⁾³⁾

By FRANKLYN D. OTT

Abstract

The author gives an English language translation of ARESCHOUG'S 1870 memorial, in the Swedish language, to C. A. AGARDH (1785–1859), the world renowned Swedish phycologist. Not only was C. A. AGARDH an accomplished phycologist but he also had made significant contributions to the fields of mathematics, agriculture, economics, and theology. It is intended that the present translation may help to place into proper perspective, for those who may not be fluent in the Swedish language, AGARDH'S far ranging activities in other non-phycological disciplines and help explain why after 1830, AGARDH'S phycological contributions decreased significantly. A comprehensive bibliography of AGARDH'S phycological publications is also given, including the reviews of these which were published by his contemporaries.

Introduction

C. A. AGARDH (1785–1859) was one of the world's greatest phycologists of the early eighteen hundreds. His fame outside of Sweden resides essentially from his phycological contributions. Within the scope of three major publications, AGARDH was the first to bring some order out of the chaos which had developed from the practice of post-LINNAEAN workers in attempting to place the hundreds of new algal species, which had been described since LINNAEUS' *Species Plantarum* of 1753, into the few algal genera which LINNAEUS had recognized. In 1817, AGARDH published his *Synopsis Algarum Scandinaviae* in which he laid the foundations for algal reform. He continued this reform in the first part of his *Species Algarum*, which was published in 1820 and which remains incomplete after the publication in 1828 of *Voluminis Secundi, Sectio Prior*. Fortunately, in the interim between 1820–1828, AGARDH published a shortened account in 1824 entitled *Systema Algarum* in which he outlined his so-called natural system. In view of the fact that his *Species Algarum* (1821–1828) was never to be completed, *Systema Algarum*, thus, became the published basis for his new reform.

During these early years of phycological endeavors, AGARDH also published a number of contributions in mathematics, agriculture, and Swedish economics. After 1830, his phycological contributions dropped dramatically, with ever increasing energies devoted to theology and Swedish national economics. Indeed, his greatest contributions to posterity may well lie in his endeavors in the field of Swedish national economics and not necessarily phycology. In this regard, he was cut from the same fabric as were our own BENJAMIN FRANKLIN and THOMAS JEFFERSON, among others, who belong to the closing of that great historical period, **the Age of the Enlightenment**, in the sense that AGARDH also excelled in a number of widely separated and unrelated fields of human endeavor. R. E. FRIES (1950), the Swedish botanical historian, considered AGARDH "one of the most versatile geniuses of Sweden". In all probability, this state of ignorance concerning AGARDH'S non-phycological activities, outside of Swedish borders, can be attributed, in the main, to the fact that his biographical accounts as well as his collected letters, speeches, and works have been essentially published, with a few minor exceptions in the Swedish language. Even in Europe, whose citizens excel in the study of foreign languages far better than we do here

¹⁾ This paper is dedicated to the memory of my beloved professor, the late Dr. RUFUS H. THOMPSON (1908–1980), Professor Emeritus, the University of Kansas, Lawrence, U.S.A.

²⁾ This article has been extracted from the author's larger work entitled: OTT, F. D., AGARDH'S 1824 *Systema Algarum*, 2 Vols. J. Cramer in der Gebrüder Borntraeger Verlagsbuchhandlung, Berlin, Stuttgart (in press).

³⁾ This article constitutes an English language translation of J. E. ARESCHOUG'S memorial to C. A. AGARDH as it was published, in the Swedish language, in *Lefnadsteckningar öfver Konglige Svenska Vetenskaps Akademien Ledamöter*, Vol. I. (Stockholm), 1870.

in the United States, there are few professional, non-Scandinavian phycologists who possess a working knowledge of the Swedish language.

Since, I, too, am deficient in this Scandinavian tongue, I could make no original contribution to the aggrandizement of our knowledge concerning AGARDH's non-phycological activities. Having, regretfully, resigned myself to this state of affairs, I then had the good fortune of being introduced to a native Swede, Mrs. VANJA KING (née JOHANSSON), who was a candidate for the Master of Arts Degree. Mrs. KING kindly translated literally into English J. E. ARESCHOUG's memorial to C. A. AGARDH as it appeared in volume one of *Lefnadsteckningar öfver Kongliga Svenska Vetenskaps Akademien Ledmöter* (Stockholm), 1980.

This literal translation was made somewhat more cumbersome by the Swedish syntax and metaphors commonly employed in the 1870's. I have reworked this literal translation into a more readable English idiom. However, because I did not wish to deviate excessively from ARESCHOUG's presentation, a few stilted constructions still may persist for which I take full responsibility, beseeching, however, the reader's indulgence in such instances. It is hoped that the following English language translation of ARESCHOUG's memorial will give some insight, at least for the phycologist, into AGARDH's wide ranging, non-phycological endeavors. The reader is referred to recent work by B. WALLERUS (1975) which deals primarily with these other endeavors up until about the year 1835.

CARL ADOLPH AGARDH. Professor, Bishop

CARL ADOLPH AGARDH was born January 23, 1785, in Båstad, Sweden, son of GEORGE MICHAELSON AGARDH (or AGAARD), a merchant who had moved to Sweden from Schleswig. Båstad is located on a cape where the waves of the Baltic and the North Sea meet and cast ashore many a "vilis alga". While we do not know for certain, this inquisitive lad may have been beckoned to his future calling by the many curious algal forms washed onto these shores. The hallowed Newtonian apple represents only one of the many circumstances which have directed human genius to great discoveries or point the way to a foreordained career. At the early age of 14, AGARDH had finished his pre-university schooling; he was propelled by a great eagerness for knowledge which was accompanied by a great capacity for its absorption. On the 5th of October, 1799, he registered as a student at the University of Lund. AGARDH's name appears on the same register sheet, right after ESAIAS TEGNÉR, the renowned poet, who the day before had been registered at the University, the encounter of two names both to be carried later by fame far beyond the borders of their native land.

AGARDH partook of all the subjects comprising the college of Philosophy especially those in mathematics and botany. He was awarded his earned degree at the graduation of 1805 and was immediately faced with making a decision as to whether he should secure a teaching position or stay on at the University. This confrontation with the then contemporary difficulties of supporting himself without resources as an unpaid professor summoned him to the former while his love for a more scientific existence bade him to the latter. AGARDH wanted to apply for a teaching position which had just become vacant at the school in Marstrand. But he remained at Lund on the counsel of Prof. JONAS BRAG who wanted to keep him at the University. In this manner the University gained a teacher of the highest order and this modest gentleman, J. BRAG, was granted the only favor he ever solicited.

In 1806, AGARDH's first work in botany, *Caricographia Scanensis*, was published. This was followed the next year with a mathematical thesis which gained him an appointment as professor of Mathematics. In addition, another fortuitous event occurred: the president of the University, COUNT VON ENGESTRÖM, selected him to be his son's teacher.

AGARDH, thus, was given an opportunity to sojourn in Stockholm and to travel abroad. In the capital, he made contacts and became acquainted with the most talented of Sweden's then living botanists. He made these acquaintances both personally and through his office as Secretary of the Royal Academy of Science. In this latter position he continuously aided every serious student of LINNAEUS' science.

There were many great masters fired by a burning desire for scientific research and thrilled by great memories of LINNAEUS and who unquestionably made an impression on a mind such as AGARDH's. In Uppsala, LINNAEUS' successor, the widely traveled THUNBERG, was professor; his

high enthusiasm undoubtedly dimmed somewhat by the enormous amount of material he had collected on three continents. In Lund, there was JOHAN RETZIUS who possessed a keen intellect and who was simultaneously a zoologist, a botanist, a chemist, and a mineralogist. He was a master of a "Sea of Science", and an excellent author in its various disciplines. PEHR OSBECK lived quietly and hidden away in Hasslöf. With the devout mind of a child, he was, according to some, the very first to early awaken AGARDH's interest in the flowering plants when the latter was only a lad.

These faithful disciples of the LINNAEAN school perceived the science exactly as their master, LINNAEUS, had before them. They scarcely imagined that a different approach would soon appear. An indication of a new era was first given by two of LINNAEUS' younger students, OLOF SWARTZ and ERIK ACHARIUS. LINNAEUS had placed into the 24th Class of his Sexual System all the plants which were not then known to possess sexual organs. He failed to recognize that within the Swedish flora itself there existed potential classes of these so-called cryptogams far more numerous than the phanerogams, and that, therein, laid fruitful fields for extensive investigations. From these potential cryptogamic classes SWARTZ had early chosen the ferns and mosses while ACHARIUS had chosen the lichens for their main spheres of study. Both of these workers went far and were hailed as excellent reform workers. SWARTZ became a bryologist, the equal of the world renowned HEDWIG. In our time, ACHARIUS' worth as a lichenologist has reappeared with renewed brilliance from that hiding place where a faulty opinion had pushed, for awhile, his true scientific due.

At a slightly later date, the young GÖRAN WAHLENBERG was measuring the heights of the Alps as well as wandering through the desolate areas of Lappland studying critically the Phanerogams of his native Sweden. Posterity has given a place to this future climatologist and plant geographer beside ALEXANDER VON HUMBOLDT.

In reality, this was a shining picture: the background adorned by the older students of LINNAEUS and the foreground by the younger scientists such as SWARTZ, ACHARIUS, and WAHLENBERG who were to form a new era for plant studies in Sweden by focusing attention on the study of cryptogamic plants and on the study of the native vegetation of Sweden. AGARDH early became acquainted with these gentlemen. In SWARTZ, he soon found a devoted friend who in every way helped and encouraged his every budding talent.

Swedish botany had attained this stage of development as Prof. J. RETZIUS was approaching his retirement age. RETZIUS' standing with the president of the University, COUNT von ENGSTRÖM, offered AGARDH the hope of promotion to a professorship in botany. There still remained two groups of cryptogams, the algae and the fungi, which no Swedish botanist since LINNAEUS' time had studied intensively. AGARDH chose the former of these two groups for his studies. The remaining group soon found an epoch making reformer in the mycologist, ELIAS FRIES, who suddenly and competitively appeared by AGARDH's side.

AGARDH began his algal studies, as he said himself, without books and collections and without the benefit of good optics. As a lecturer in mathematics, he published as early as 1810, a mathematical thesis. The same year, after having been appointed Extraordinary Demonstrator of Botany and Ordinary Associate Professor in Economics, AGARDH published the first part of **Disposito Algarum Sueciae** (to appear in five parts, 1810–1812), a work which allied itself with the preceding time and which contained the hitherto known Swedish algae. This publication bore fruit. Shortly after AGARDH had been recommended in 1811 for a professorship in mathematics, he was appointed Professor of Botany and Economics. His reputation as an algologist had grown. SWARTZ, THUNBERG, and TILESIIUS, among others, now sent him heretofore undescribed algae. These AGARDH published as academic theses: **Algarum Decades I–IV**, Lundae, 1812–1815.

While pursuing these scientific endeavors, however, AGARDH was not without economic problems. When Professor RETZIUS retired from the professorship in Natural History the discipline was divided into three parts, namely, Chemistry, Zoology, and Botany. In the beginning all three of these were accompanied by little or no financial remuneration. This

situation caused AGARDH to take Holy Orders in 1816. He was then appointed Vicar of St. Peter's Parish while still retaining his professorship, then, not an uncommon arrangement at Lund.

In these new positions, AGARDH perhaps felt, for the first time, completely independent and unencumbered to sacrifice his time and energies to the service of botany. By 1817, it is obvious that his phycological endeavors reached a new stage. During that year he published **Synopsis Algarum Scandinaviae** which, in a very few pages, laid the foundations for the transformation of phycology. He also initiated the publication of **Aphorismi Botanici**, in 16 parts, 1817–1826 in which he attempted to rework in its entirety the natural system of plants.

The Bard of FRITHIOS [FRITHJOFS] once said "The general does not win the battle by himself, the deep lines of troops win it for him." This adage contains a truth as long as one doesn't forget that it is the general who leads the troops. Without an army no battles are won, and no scientific reform can succeed until the accrued experiences are sufficient to fill the hand. The "deep lines" may then be drawn and their positioning depends upon the reformer's ability to win a suitable victory for humanity on the great field of knowledge. LINNAEUS won a triumphal battle, perhaps far greater than most that have been won on that field. But surely one is misled if he believes that Linnaeus with his magic wand, namely his genius, brought forward the science which forms the foundation of his honor and fame. Far from that being the truth, the needed material had been long collected and the all important suggestions for the needed reform can be traced to a great extent to the predecessors and to the contemporaries of Linnaeus.

The same is true for AGARDH in regard to the algae. It has been stated previously herein that no one in Sweden had studied the algae intensively. While this is true for Sweden, it is not true for other countries. HUDSON, WOODWARD, WEBER, MOHR, ROTH and TURNER, among many, had made valuable contributions to the specific knowledge of these plants and had described many new species; they had the failing, though, of assigning them to the old genera of LINNAEUS: *Conferva*, *Ulva*, and *Fucus*. Thus, TURNER's outstanding contribution, **Historia Fucorum** (1808–1819), while rich in significant observations and supported by many excellent plates, contains only the single genus, *Fucus*, to which he had assigned, without any order, algal species of the most varied nature. In a similar manner, DILLWYN had placed in his beautiful work, **British Confervae** (1802–1809), all of the articulated algae into the genus *Conferva* without regard to the great variance in the other characteristics possessed by these plants. These two works, and many others not to be mentioned here, demonstrated, however, the need for a thorough reform. They also prepared the ground work for such through the wealth of material and the excellent analyses which they contained. At this point in the development of phycology, LAMOUREUX presented in 1812 to the French Institute his "**Essai sur les Genres de la Famille des Thalassiophytes non Articulées.**" In this treatise he laid the foundation for delimiting genera of brown and red algae, especially this latter group, many which still exist today with varying degrees of modification. LAMOUREUX's contribution was excellent and, in this regard, he may be considered to be to AGARDH what TOURNEFORT was to LINNAEUS. However, the criteria for the main divisions into which LAMOUREUX had placed the algae were not as good as they might have been; the characteristics he used being rather superficial.

Some examples, however, of LAMOUREUX's categories may be of interest to the reader: 1. Fucacées, "hard, olive-colored, blackening in the air," 2. Floridées, "red- or purple-colored, shining in the air," 3. Dictyotées, "leaf-like, net-structured, never blackening in the air," 4. Ulvacées, "green, greenish or white in the air," 5. Alcyonidées, "*Alcyonium*-like", 6. Spongodiées, "sponge-like, green, darkening in the air."

It should also be pointed out before leaving LAMOUREUX's contribution, that STACKHOUSE had several years earlier, in 1807 (sic 1809), published his **Tentamen Marino-Cryptogamicum** in which he arranged the Fucaceae and the Florideae into 38 families. Regretfully he derived the family names in such an archaic manner, and delimited them by such obscure characters that most authors silently ignore this contribution. For our consideration here we can do the same.

Returning now to AGARDH's **Synopsis Algarum Scandinaviae** we encounter within the first 40 pages a short and precise survey of all the algae known to AGARDH including both the so-

called articulate and nonarticulate types. He retained the majority of LAMOUROUX's genera and added several new ones. He defined each as precisely as was possible for his day. In the larger families the species were arranged into groups or into subfamilies which in time were raised to independent families by AGARDH himself or by others. The whole of the algae were divided into five sections whose delimitations were more significant than LAMOUROUX's.

This work aroused great interest within the scientific community. OKEN had only high praise for it in his review in *Isis*, a very prestigious journal for its day. LAMOUROUX retired with feelings he had been outdone by the Nordic phycologist who scarcely had seen living marine algae, save for the few which by chance had been washed ashore at AGARDH's native Båstad. This feeling was understandable in view of the small size of this tome in which AGARDH had laid the foundations for a more scientific and systematic approach to the algae by means of a few specific and positive sentences.

Once the synopsis for a new system had been published, it should be reasonably certain that AGARDH would proceed with a more comprehensive treatment based upon this publication, and, indeed, this is exactly what he did. He initiated the publication of a larger work in which he attempted to arrange and to describe more fully all of the hitherto recognized families and genera comprising the algae. He began the work with the typical energy and eagerness which was characteristic of him in all of his endeavors. The first parts of *Species Algarum* were published during the years 1820–1822 in which he completely delimited and described all of the then known Fucoideae, Florideae, and Ulvaceae even though the material available to him was surprisingly minimal by our contemporary standards. In considering this publication one should realize that, on one hand, AGARDH used assiduously the rich fountain of knowledge in TURNER's masterly treatise, *Historia Fucorum*, while on the other hand one must attribute the delineations of the families and their various subgroups as well as the grouping and the relationships of the species solely to AGARDH. However, the continuation of this work was interrupted for a time, according to AGARDH, because of "infelici casu". In the interim, *Systema Algarum*, 1824, was issued. This work contained only the delimitation of **all** the algal families and genera known at the time. It constituted a synoptic survey of the algae and was characterized by its neat and concise form, by the obvious and clear arrangement of the subject, and by the short but precise, sensible definitions. This publication may be considered an epoch making contribution to the developmental history of phycology. With a single blow, AGARDH achieved his reform. New orders and families were established, time honored species were more succinctly delimited, and many new ones were defined. AGARDH had listed 45 genera in *Synopsis Algarum Scandinaviae* while in *Systema Algarum* the number of genera had increased to 101 with the number of species ascribed to these being about one thousand (actually 1625 species and varieties!). If one places AGARDH's little book on the shelf beside the works of TURNER, DILLWYN, VAUCHER, ROTH, LAMOUROUX, and all of the other works of his predecessors, one will easily note the great wealth of material available to him. But it should be emphasized that it was AGARDH who brought order to it all and placed the whole into a more scientific form. This was the goal he sought and he achieved it.

AGARDH then again turned his thoughts to the publication of his more extensive work, *Species Algarum*. As was pointed out previously, his opportunities to study living marine algae had been severely limited. He made a successful application to the government for funds to finance a trip to the coast of the Adriatic Sea. This was undertaken in 1827 *via* Greifswald, Berlin, and Vienna. Venice, along with Trieste, was selected as the main coastal area for study. At the end of the summer, the return to Sweden was made *via* Carlsbad where AGARDH for a couple of weeks had time to study there the algal vegetation of the hot springs. He personally became acquainted with the philosopher, SCHELLING, whose writings in Natural Philosophy gave, at least for a time, a strange cast to inductive reasoning as it was applied to research in the Natural Sciences. After returning to his native land, he prepared a special treatise on the numerous families and genera he had found during his trip. This was published, among other places in *Flora (oder Botanische Zeitung)*, Regensburg, under the title: **Aufzählung einiger in den österreichischen Ländern gefundenen neuen Gattungen und Arten von Algen . . .** (1827), and, later (1831), **Bericht über**

eine botanische Reise nach Oesterreich und dem nordöstlichen Italien im Jahre 1827. The former was followed by *Icones Algarum Europea*, in 4 Libras, (1828–1835), and by *Species Algarum*, Vol. II, Sectio Prior (1828), after which, all further publication of the *Species Algarum* ceased forever.

We have followed the progress of AGARDH'S career as a reformer in the Science of Phycology except for a few of his minor writings. In 1829 his interest and consciousness were turned in another direction.

Conspectus Criticus Diatomacearum, in 4 Pars, (1830–1832), published as dissertations, and *Revision der Algengattung Macrocystis*, (1839), form, as can be best recalled, the last links in his chain of algal publications.

For science, LINNAEUS' binomial system had two advantages. The first made it possible to master to some degree the great mass of plant diversity by formulating clear and decisive attributes for plant classes and orders. The second advantage, as ROBERT BROWN had stated it, was to prepare the groundwork for the comprehension of the reproductive structures by continuously focusing attention to the individual parts of the flower, especially the sexual parts. The former advantage was of practical value while the latter was scientific. LINNAEUS himself looked upon his artificial system as a tool, and looked upon the natural system as one of the highest goals for science to attain. However, the practical side of the binomial system succeeded in making it acceptable in Germany and England, not to slight the other European countries, and has been in almost continuous use therein, without exception, until the present time. But in France, where researchers strove to develop the natural system, the artificial system never gained wide acceptance. In Sweden it was the sole master with the natural system scarcely being considered any more than just a name. Since LINNAEUS, no Swedish botanist had pulled a single straw to the top of the stack to further develop this natural system. No one had attempted a new arrangement of the families nor had a single new one been delimited. Swedish botanists, in this respect, stood firmly behind the original concepts of LINNAEUS. It was left to AGARDH to here formulate new ones. His *Aphorismi Botanici* (1817–1826) and *Classes Plantarum* (1825), published as academic dissertations, are significant works which, without question, pointed the way to natural families of plants as a new field of scientific endeavor. The system espoused by AGARDH in these publications received little acceptance. But acceptance cannot really be demanded from a system which is based upon the dynamic accumulation of facts, and, therefore, must continuously break at its seams to accommodate them. But in spite of this, the concepts which AGARDH contributed to the understanding of the plant kingdom were not insignificant to the developmental history of the natural system of plants.

The four main groups into which he divided the plants can be encountered in the writings of earlier authors, but not delimited as AGARDH had here done. These divisions are Acotyledoneae (= Thallophyta), Pseudocotyledoneae (= all cryptogams bearing archegonia), Cryptocotyledoneae (= Monocotyledoneae), and Phanerocotyledoneae (= Dicotyledoneae). To reject, as DECANDOLLE had done, the division of the plant kingdom into Cryptogams and Phanerogams, or into cellular and vascular plants, closes a window to the future. Together AGARDH'S four main groups comprise 33 orders, each one having a lesser or a greater number of families. For example, Phanerocotyledoneae (= Dicotyledoneae) is divided into 1) incomplete and 2) complete, with the latter also divided into a) Hypogynae monopetalae, b) Hypogynae polypetalae, c) Discigynae monopetalae, d) Discigynae polypetalae, and e) Perigynae. AGARDH recognized 202 families of which no less than 12 were authored by AGARDH himself. Subsequent workers employed and accepted the majority of these, for example: Guideae, Stilagineae, Petiverae, Rivineae, Ulmaceae, Datisceae, and Papayae. It is hoped that this brief review will direct attention to AGARDH'S contribution to the development of a natural system of plants, which is also a Swedish contribution and one which should not be forgotten. This is especially desirable since authors abroad, e.g. BISCHOFF, the noted botanical historian, freely conceded to AGARDH the honor of being the first who, to a great degree, succeeded in advocating natural arrangements.

We have hereby described AGARDH as a diligent worker in descriptive botany. We have

welcomed him as a reformer in Phycology. We have become acquainted with him as a systematist in the natural history of plants. In this capacity he is on a close par with ROBERT BROWN and JUSSIEU if not their equal; he was held in esteem by both. But what was the source of the ideas he utilized in formulating these new concepts? Did he treat the subject here from the point of view of natural philosophy? Did he erect families, orders, phyla, and even the whole system from a natural philosophical scheme concocted in his own imagination as did many other authors of his time? These questions may have a place here since AGARDH had been criticized for letting hypotheses take the place, to a large extent, of real experience, and for permitting a great idea to excite him to advancing unreasonable theories or to defending absurd ideas. The response will be short. Within the discipline of botany, AGARDH was LINNAEAN and strictly followed LINNAEUS' ideas. This is demonstrable in all of his works belonging to those categories requiring a clear and objective deposition of the subject. These are unencumbered by all of those products of his imagination which are evident in other endeavors that he relentlessly pursued.

The LINNAEAN school considered, and probably many of its disciples still do, that it is the greatest goal of science to discover all the different plant forms in the world, to characterize the species, and to assign them to the appropriate genera, orders and classes. But AGARDH did not hold the same opinion. Even though he had won his finest laurels through his treatment of systematic botany and even though he was quite fond of this discipline, he still did not consider it to be the science in its entirety; he didn't just want to study the plants but also the plant, its nature and its morphological, anatomical and physiological attributes.

During the first two decades of the 19th century a new approach to botanical investigations was initiated. Plant Anatomy which was founded so honorably by MALPIGHI, GREW, and LEEUWENHOEK but which had been almost disdainfully forgotten in the 18th century, now underwent a renaissance by eager workers such as MIRBEL, TREVIRANUS, RUDOLPHI, KIESER, SPRENGEL, and MOLDENHAUER. GOETHE's metamorphosis theory, even though its main ideas had been put previously forward by WOLF and LINNAEUS, awoke even greater enthusiasm. This enthusiasm was partly due to the fact that it came from the pen of the world renowned poet and partially because it was advanced by GOETHE at about the same time as were the morphological theories of JUSSIEU and ROBERT BROWN. But this new direction in botanical research appeared almost simultaneously with SCHELLING's theories concerning natural philosophy. The effects of SCHELLING's influence on pure, inductive, biological research were apparent even though the influence remained essentially within the borders of Germany and hardly, if at all, crossed the borders into France and England. What SCHELLING's natural philosophy meant to the developmental history of philosophy may best be told by the philosophers. But its effect on scientific approaches to botany, e.g. KIESER's **Aphorismen aus der Physiologie der Gewächse**, NEES VON ESENBECK's **Handbuch der Botanik**, etc. pushed aside, for a long time, pure objective study. In its place, there appeared empty speculation and unlimited fantasies. Some philosophers borrowed from the physical sciences certain ideas which were held to be sound explanations for the nature of organisms, however foreign they may have been to reality.

May I only be allowed here to show with a few examples to what degree even such excellent scientists as KIESER and NEES VON ESENBECK delved into speculation in natural philosophy. KIESER: "Unter den auf dem Erdkörper vorhandenen Welten der Organismen bildet die Pflanzenwelt den Magnetismus, das Thier den Electricismus, der Mensch den Chemismus. Die Pflanze in ihr Integrität ist der organische Magnet; der Stamm der Pflanze ist der positive Pol, die Wurzel der negative; Das Wasser entspricht der Wurzel, die Luft entspricht dem Stamme der Pflanze." Or from NEES VON ESENBECK: "Die Pflanze representiert die ganze Längsachse der Erde, sie zerfällt also als ganzes in zwei Pole. Der eine Pol ist der Pilzpol; Nordpol, der Erde zugerichtet. Der Zweite geht nach oben und ist der eigentliche Südpol der Erde in organischer Besonderheit," etc., etc. Into such philosophical games of children, has fallen no Swedish scientist!

As we have mentioned already, AGARDH possessed a special affection for the study of plant anatomy and physiology. It should not surprise the reader that his richly creative imagination was

somewhat influenced by the natural philosophical trends of his time, especially a time in the history of science when experimental observations were considered of little importance. Few have been able to bring together, as had AGARDH, scattered observations by means of hypotheses pertaining to morphology, theories which simultaneously bore the stamp of beauty and of truth. These easily excited him as well as others. And added to this, SCHELLING's philosophy, at least as it was applied to the natural sciences, created an undisciplined era during which the imagination, demanding room to express itself, sought to abolish the burdensome laws to reason. In this intellectual environment one is forced to concur that AGARDH was only barely guilty of these transgressions. It is true that his work, *De Metamorphosi Algarum*, published in 1820, and by which he attempted to prove, in regards to the very lowest forms of plants and animals, that changes could take place between plants and animals, from a moss to an alga, a lower alga changing to a higher one, and so on, lent support to judging him deficient in the quality of his observations. It is also true that his proposition to the effect that the infusoria possessed the same hypnotic power as did snakes may be correctly referred to as a game of the imagination possessing strained analogies. However, it must be truthfully admitted that this was the custom of his era. This uncomplimentary state of logic may be attributed to three causes: the first was the lack of appropriate optical instruments, the second was the attack of the inductive sciences on SCHELLING's natural philosophical theory, and the third was the failure universally to accept the need to study morphogenesis. During this time, to which we are here referring, it was imagination which most often took the place of continued observations, and, in this respect, offers the greatest contrast to our contemporary ideas. Regardless of that, it cannot, thusly, be denied that AGARDH quite often formulated his theories on the basis of accumulated hypotheses. It should also be succinctly noted that AGARDH, just as the natural philosopher, NEES VON ESENBECK, considered ROBERT BROWN the brightest star of botanical science. BROWN was a sober and objective researcher untouched by any speculations in the vein of the natural philosophers. AGARDH was then on the border between two different movements: the speculation of the natural philosophers and the experimentally inductiveness of our contemporary times. His theses on Plant Anatomy, on cyclosis in the Charophyta, and also on the germination of fern spores belong to this latter movement, and as such, are the first from a pen held by a Swedish hand.

It has been mentioned already above that AGARDH met SCHELLING in Carlsbad and spent there in SCHELLING's company "the most interesting days of his life." AGARDH shared with him his opinions concerning anatomy and physiology of plants. He was encouraged by SCHELLING who offered to find him a publisher to disseminate these ideas. This visit with the philosopher who was at the peak of his European reputation was not without influence on physiological botany. AGARDH was drawn closer to the speculative side of science. This opinion is substantiated in two of his pamphlets, one on physio-morphological considerations and the other on plant anatomy, which were published respectively in 1828 and 1829. Following this, the ideas and theories outlined in these two works were developed more thoroughly in his own manner with the publication of his *Lärobok i Botanik* (1829–1832) issued in two volumes, the first dealing with *Organografi* and the second with *Wext-Biologi*. This work was dedicated to SCHELLING. In the dedication AGARDH presented his opinions concerning the relationship between philosophy and natural science. As alluded to above, AGARDH was far from being a stranger to the experimentally inductive movement of the natural sciences. He wrote in the preface to the volume on organography, "that such a work as this cannot be free of hypotheses is self-evident. Hypotheses have always been necessary; they have never harmed the sciences, but on the contrary, aided the sciences, even if they were found in the final analysis to be unsubstantiated; they are the **Regula falsi** of the natural sciences. Under a false presupposition they may yield a correct conclusion. They are, in addition, the stairways of science. By them, science climbs to even higher heights. All at once the horizons open wide and all can be encompassed with a single glance. Without hypotheses the scientist would find himself on a flat field where he would be forced to move from object to object in order to become familiar with them."

From among these words one may suspect that AGARDH held some doubts as to whether an

inductive science should be treated in this fashion. Be that as it may, one has to justly admit that AGARDH's investigations within these so important disciplines of botany were new fields for Swedish endeavor. It also need be admitted that this, his textbook, however rich in hypotheses, also contained still the most advanced knowledge pertaining to plant anatomy and physiology which was available to his era. Thus, it has great merit, especially for a country whose whole botanical literature could not demonstrate any other clue pertaining to plant physiology other than meager terminological prefaces to Swedish botanical books and for a country whose people still believed that the whole of botanical science consisted of the Latin names given to plants. However, these works of AGARDH attracted great attention abroad as soon as they were published. Those that were written in French were promptly reviewed in French journals and his Swedish language textbook was translated into German. But soon the approach to science was altered by a significant change. The Natural Philosophy of SCHELLING sunk ever deeper into disfavor, pulling down, in its demise, most of the scholarly works which were influenced by its spirit. People chose for a principle BACON's **Non fingendum aut excogitandum, sed observandum quid natura ferat et faciat**. The younger generation swore by that principle and by it won many victories. But we shouldn't forget over what had triumphed the older generation in the battle to determine the truth.

AGARDH was not only Professor of Botany but also of Economics. His genius encompassed with interest every part of human knowledge, and with unrelentless industriousness he doubled his efforts. Economics were not to be forgotten. In the beginning he wrote several theses which pertained, in reality, to agriculture or gardening, e.g., the utilization of seaweeds in agriculture for which he won the scientific and literary prize of the city of Gothenburg, the utilization of fodder beets for sugar, concerning fiorin-grass and concerning tobacco cultivation; all papers of solely economic nature in the meaning which this word was used in the eighteenth and at the beginning of the nineteenth century. The reason for this activity came from without. As Vicar of St. Peters Cloister's sinecure parish, AGARDH was specifically called, by the confidence of the brothers of his diocese, to be a member of the state and bank revision committee which in 1817 found, in one of the discounting transactions, not only a decided unfavourable balance, but also errors in the administration of discounting transactions. In the parliament which began soon after this he also took part, as a subcommittee member, in the all important meetings pertaining to the country's money transactions. He attended parliament as the representative from the Lund Diocese in 1823 and 1824. At the first of these parliaments he showed, with knowledge and strength, the danger to the country in dividing up, to individual owners, the land owned by the crown. But they didn't listen to him at this time and some regretted it later. By these means AGARDH gained entrance to the broad field of national economics. Even here he became an industrious worker and published in 1829 in the form of an academic thesis "**Ganskning af Stats-Ekonomiens Grundl aror**" (Study on the Principles of National Economics); in **Tidskriften Svea** a thesis entitled "**Om Positiv och Negativ Rikedom**" (Concerning Positive and Negative Wealth) and also a Swedish translation of BJ RNSTJERNA's work on the English national debt. This latter work was accompanied by a preface in which AGARDH builds, as in his aforementioned works, upon his own ideas and attempts to prove both the usefulness and rightfulness of the national debt. Concerning the rightfulness of the national debt he wrote, among other things: "The costs of the state are of two types. One belongs to the current year; the other one has more or less bearing upon the future, or is, in reality, an article of stock which is deposited to yield money and advantages either continuously or during an extended future period. The justice, which we take for granted as an element in all systems of taxation, cannot take place if the era which will have the advantages will not have to pay the taxes for them. A later time will be composed of different citizens than this one. And, as unjust as it is, if during the present time, there are citizens who pay no taxes, it would be just as unjust for citizens who live in a later time to withdraw from paying taxes. A national debt is nothing more than a debt drawn on the future. In the event that one of the present era would make the statement that the future, according to this opinion, hasn't the same right as the originator of the debt to protest it, then it must be remembered that the present era is acting as a guardian for a later time. The present and the future have the same relationship as father and son,

as testator and heir. But by the same right which the former can pay his debt, or mortgage it in his property to be redeemed by his heir, he can postpone the payment of a debt to the future which will inherit the wealth. It is, after all, on its own wealth that the present era has drawn its own promissory note. It is, after all, paid by the present era even if the payment term has been postponed; and the future loses more, if the present era lessens the inheritance by decimating its productive capital, than if it pays only the interest and not the principal. This is the way all persons should act who wish the best for their heirs; this is the way the state should also act. The usefulness of a national debt is proven by England's example, 'since a national debt which is joined by a wise system of funds brings forth a large industrial movement, pushes the interest rates down, creates public and individual credit, and promotes the well being of the state in all spheres' and so on."

Such views, though dressed in the most beautiful adornments of Swedish words, seemed too paradoxical for that era, and BJÖRNSTJERNA's book as well as AGARDH's preface itself became the object of a long and "careful" review in *Svenska Litteraturföreningens Tidning* for 1833 in which the reviewer, only in one case, grants the legitimacy and usefulness of a national debt, "specifically that it be a necessary means for the salvation of the country in the event of an enemy attack." Thus, opposed to each other's, were the many views on this question, and very few of these were on AGARDH's side. Among these perhaps was TEGNÉR, who complained that people "feared state (federal) bonds as a ghost and didn't just want to be poor, but to forever be poor, for the honor of leaving to their heirs a mortgage-free squalor." Times have changed. Even though Sweden still lacked an internal national loan system, which was AGARDH's greatest goal, and whose existence in England he looked upon as the chief reason for that country's high financial position, Sweden still had a national debt. Are our mortgage companies and our railroads useful? and have they shared in the development of the country's internal status in one as well as the other respect? Has it been crucial in and for the country's cultural development in equality with the other European states? In the event that the indebtedness which the state had adopted for these things, has it not brought some advantages? Are these, harvested at a later time, not only by the present generation but also by several later ones? Then these future generations are obligated to pay their share of the national debt to a certain degree. A national debt, always supposing that need caused it, can in this manner be both useful and justifiable. Such was, with a few words, AGARDH's opinion, if we are not mistaken. He has been victorious, and very few now should share the opinion of the above mentioned reviewer of that era.

In 1828, the best intellects of the country among which, of course, was AGARDH were appointed to a committee under the leadership of H. R. M., the Crownprince. This committee was charged with examining the condition of the country's public education system. It was easy to prophesy that great differences would soon arise among the twenty-two members of the committee; indeed, this prophecy was soon borne out to be true. It was a battle between the old and the new, on the one side, between the champions of classical studies who wanted to keep the whole to themselves, yes, even to recover the pieces thereof which they had lost long ago, and, on the other side, the champions of the newer literature and the Natural Sciences. In the former camp could be counted, among others, WINGÅRD, HANS JÄRTA, and OTTO LINDFORS. In the latter camp were to be found AGARDH, BERZELIUS, TEGNÉR and a few others. Among all of these, AGARDH was the most imposing. He was best prepared for battle because not only did he wear the armor of the classics but also the armor of modern science. The supplements written by AGARDH, and which accompanied the committee's reports, are masterpieces both in regards to the beauty of the Swedish language and the formal treatment of the subject. The committee was more than once carried away by his brilliant method of presentation. Bishop WINGÅRD told ARESCHOUG: "We often had to break off the subject or meeting or else we would have been beguiled to accept his opinions." Without becoming lost in the labyrinth of the numerous questions in which AGARDH was of one opinion and the committee, wholly or partially, was of another, we should note that AGARDH spoke with fervor especially on two things, namely: 1) for the study of subjects in school and the association of this study with free movement from class to class and 2) for the acceptance

of the Natural Sciences as subjects. But for these, the champions of the classics wanted them to have only a place, not in the theoretical schools, but in the vocational ones, ridiculously considering them to be of value only because of their usefulness.

A great change took place in 1830 in regards to AGARDH's standing in Lund. Up to this point he had easily accepted the scientific work, esteemed and beloved by his students, and was surrounded by numerous friends and admirers. In spite of this, however he began to feel more and more uncomfortable and looked down every road which might carry him away and open up a new arena for his labors. His always easily excitable mind was brought to the epitome of impatience after having been suggested for the bishopric of the Kalmar Diocese only to see it go, after a long wait, to another; also an appointment as Minister of Education was denied him in spite of his great experience. Many plans, ideas, and suggestions crossed his fertile mind. At one time he wanted a parish in the beautiful forests of Blekinge. Later, in harder times, he wanted to completely reject the clerical field, to move to Stockholm, Paris, or London, and to live on his savings undisturbed in the rich world of ideas which he carried within himself. One may call such a dream unreasonable, but perhaps it is a dream to be dreamt only by those who are fully conscious of their spiritual powers being able to establish new life styles.

It was BERZELIUS who pushed away that fog which prevented AGARDH from seeing his own real position. BERZELIUS was a friend of long standing. This chemist, whose fame rested on his solutions to many difficult scientific questions, could follow his inclinations and speak freely to AGARDH. He wrote in May of 1831: "My dear AGARDH, you are disturbed. The contents of your last letter are not the fruits of sound reasoning. Because of disappointments you wish to leave Lund and go to Stockholm, Paris, or London. Consider my dear friend, that your present position, with full professorial salary and with a good parish closely and comfortably situated, is most brilliant and is one to which any scientist in Sweden can hope to achieve. In order to rid yourself of your disappointments let them exit through the other ear and forget about them. You would probably not feel less disappointed by starving in another field. After some rest you will find yourself closer to Europe in Lund than you would in Stockholm. To complete your works you have started you lack only that inner calm. This you can have simply by making the decision to let the world go by as it may and just tell the disturbers of your peace: **'Noli Turbare Algas!'** My advice, my good AGARDH, is, therefore, keep your job. It is not only good, it is enviable. But you need some peace and quiet. Therefore, go to Vienna, that will restore you to your usual mettle." (Compare this to F. F. CARLSON's memorial speech in the Reports of the Royal Academy for 1862).

What were the reasons for AGARDH's unhappiness with his position in Lund? The low morale within the administration of the University was a major contributor according to AGARDH himself. But this morale problem was temporary and was mostly precipitated by struggles over promotional questions and especially reforms within the Department of Theology. AGARDH, who remained above these conflicts, did not have to contend with the various groups within the department and, moreover, he could count on many therein who were supportive of his views. But there must have existed, side by side with this low morale, another reason for his unhappiness. Some might suggest it was his ambition to rise higher in the service of the state. However, this was probably not a significant factor. That AGARDH coveted honor is undeniable, but not the honor of rank, but rather it was the honor he could reap with the powerful instrument of intelligence at the source of knowledge. Later, one might also suppose that the particular character of the teaching profession may have had some influence on his despondence. The brilliant teacher who is in the full prime of his youth and who has surveyed the whole field of his discipline is constantly surrounded by numerous and attentive young people who enrapturedly marvel at his knowledge and seldom doubt the validity of even his most insignificant scientific opinions. However, the development of science follows the time on the clock. In time, newer experiments, newer ideas and the theories based on these spring up all about him, and many of his own theories become outdated or lose their brilliance. To young people whose delight and admiration are influenced by these newer intellectual conditions, he has become a little less than before. When he

becomes older, when the mind wants to exert outwardly more, and to directly influence the progress of real life, he may have been unwilling again to survey his discipline in the light of these newer ideas. We don't wish to say that this must be the case with AGARDH, far from it, however, we still believe that he, at this time, considered himself as having effectively finished his calling as a writer in botany and, therefore, he was not unwilling to resign his professorship in this discipline.

But AGARDH's disposition demanded activity, and soon restless work dispelled his troubled spirit which had been master of his mind for a short time. It was during this era that he occupied himself most eagerly with many things of the most diverse nature. He completed his textbook, published his **Conspectus Criticus Diatomacearum**, translated and wrote the preface to BJÖRNSTJERNA's work on the English National Debt, wrote about the power of public opinion (in Lunds Veckoblad), about the grain commerce, about the feasibility of mortgage companies, about the production of liquor, about subjective and objective wealth. He wrote about all of these which were accepted and read with undivided admiration, even by those who did not at all appreciate the views he expressed therein. But he did not just know how to propose new and exciting proposals, but he also knew how to proceed, in practice, with their execution. AGARDH was the first to suggest the formation of the savings bank in Lund before the citizens of other Swedish provinces had awakened enough to appreciate the advantages to which the one which had been established in Göteborg in 1830 undoubtedly pointed. When the cities ceased being partners in the public fire insurance company, AGARDH demonstrated that Scanian cities could and should form a special fire insurance company and he participated not insignificantly in its execution; in gratitude for which, to this day, his portrait graces the board room. When Scanian agriculture felt the need for a more abundant source of money, AGARDH proposed the plan for the Scanian mortgage company and participated eagerly in the writing of the statutes; it became not only the first but also the only one in Sweden which did not rest on foreign loans.

However, AGARDH was soon to be separated forever from the seat of learning at Lund which with him had shared his merits and honors. In 1833 he was suggested for the bishopric of the Karlstad Diocese. His restlessness had long ago left, but doubts came again when he considered whether or not he should accept the offer. The advice of TEGNÉR and other friends settled the issue and he was appointed bishop in 1834 over the above mentioned diocese.

Again a new field for his endeavors opened up. He did not hesitate to prepare himself for the work which awaited him there. To his eldest son, in whom he had discovered a worthy successor, he turned over his collections and part of his large botanical library. Another part he exchanged directly or indirectly for theological literature. Only a small part of the library was kept, perhaps only a remembrance of previous times. Now, on his desk you could find predominantly theological works, and old and new testament which were surrounded by several theological works by both the older as well as the newer authors. He regularly took instruction in the Hebrew language and within a few weeks AGARDH, the pupil, quite often put the teacher in a quandary with his deep probing questions.

In 1834 AGARDH attended Congress and also was admitted to the Swedish Academy. He was fully entitled to his honor by virtue of his commemorative paper on LINNÆUS which was awarded the dual grand prize in 1820 as well as his eminent ability to handle the Swedish language. In the speech which he delivered on his inauguration to the academy he enlightened his audience with the opulent flow of ideas which he presented in the beginning and which were laced by flashes of genius, and with obvious sincere words by which he delivered a discourse on the relationship of poetry to nature.

On the occasion of his resignation of his position as inspector for the Scanian Province, a post which he had occupied since 1831, AGARDH delivered a speech. Afterwards, the students gathered one evening at Lund Hall to pay their respects to their outstanding teacher who was preparing to leave for Karlstad. The loss for the University by his leaving caused a sadness which was felt by all; the words he spoke made even a deeper impression.

Only a few university teachers have been admired and beloved to this degree by students. In

AGARDH's case, this was not strange. The power of his genius, his never flagging industriousness, his great knowledge and his almost as great interest in any facet of human knowledge, the enthusiasm with which he went forth to cultivate a new expanse of knowledge, all this had to enliven the students and to encourage them to fight a good fight for the right, the truth, and the beautiful. In his character AGARDH stood very close to the youth represented in his students. Human life, it is said has its spring, summer, and fall. Youth is the time of spring. In the whole of AGARDH's life, spring and the ripening fall melted into each other to form a single season. Flowers developing in rich colorfulness and ripening fruit existed on the same tree, always together. Even at the end of his life, his excitement was as youthful as in the beginning and many new buds were ready to open when the tree fell. (At his death there were several theses which remained incomplete or unpublished).

AGARDH's ability as a lecturer was extraordinary and his lectures were engrossing. The clear and easily understood arrangement of the subject, the simpleness and beauty of his easy flowing speech, the beautiful and clear voice which according to the importance of the topic was arranged musically, rising and falling, even the expression on the lecturer's face was in tune with the context of the words, all these attributes assured that once one had heard him lecture, one could never forget the impression it made.

If AGARDH, like many others, had gone off to rest on his laurels as bishop, the author should have, at this time, put down his pen and the readers would have reached the end of his literary labors. But, if it was rest which AGARDH sought, he found it only in work. His productivity as a writer was even more admirable since it encompassed not only one but several fields of knowledge. After receiving the appointment as bishop, AGARDH was for nearly ten years almost completely occupied in theological studies. During this time he translated both the Gospel according to Mathew and the First Book of Moses, wrote about the relationships between the Book of Job and the spirit of Judaism, about the origin and truth of the Holy Gospels, about Jesus' last supper, about the gift of tongues, about HENRIK SCHRAU, about the symbolic writings of the Swedish church, etc.

From this activity as a theological writer AGARDH transferred his authorship to a discipline far removed from theology, namely to the one of mathematics. This was a persistent love from his youth. The numerous mathematical theses which he published between 1840–1851, some in Swedish, some in French, became the objects of differing opinions. Those who are not trained to judge these may be excused if they accept the middle road between the widely differing views. What worth AGARDH, himself, placed on his mathematical studies, we cannot determine. But he certainly said to ARESCHOU, during an interview for this article. "Don't talk about them, they are only some ideas from my youth which give me pleasure in my old age".

One could suppose that an authorship, so widely diversified as was AGARDH's, would not leave any time for clerical responsibilities. But time he never lacked. During the parliamentary sessions of 1834, 1840, 1844, and 1847 he took part in the work as industriously as ever. He concentrated his activity in his work in the committees on banking and economics, and on the constitutional committee. He spoke fervently against taking foreign loans, but spoke out on the behalf of credit and communications considering these as the most important prerequisites for the industrial development of the country. Within his Diocese he nurtured both public and higher education. In the school at Karlstad he initiated a new system of teaching in Sweden, namely the study of subject, for which, as we have previously mentioned, AGARDH had great admiration.

Within the realm of AGARDH's responsibilities as bishop, one can follow his commitment to the private bank and mortgage company of Värmland. In 1856 AGARDH celebrated in Karlstad his twentieth anniversary as bishop; the reception was less an expression of the reverence of the priests and their devotion than it was a free expression of the gratefulness of the province. Even though encumbered during his seventh decade by bankruptcy, a phenomenon often not alien to those who consider their economic condition as only a means and who prefer to live their lives in their inner self rich with ideas, AGARDH still maintained the vitality of the soul, in undiminished strength, which would not permit itself to be downtrodden by external or material adversities. It

was during such economic conditions, in his 67th year, that he started a new work, of a more varied nature than any of his preceding ones: **Sveriges Statsekonomeska Statistik** (The National Economic Statistics of Sweden). In this work he wrote about the fortunes of the Swedish people, about the country of Sweden, about the Swedish monetary system, about work, products, Swedish agriculture, about Swedish forestry, all written as he declares in the preface, "written with sympathetic ink, the writing of which you can only read by fire, and he who does not read it by the fire of love for our country, should leave it unread." It was during these times of anxiety that this fire, far from being extinguished, gave AGARDH courage and strength to work as hard as he was capable to develop in his country a spiritual and material respect. With almost unrelenting strictness he censures in work all which merits censures and praises all which merits praise. The former in anguish over some loss for the nation, the latter in happiness over some triumph, and both judgements, even though so dissimilar, are the children and the twin sisters of his love for Sweden.

But to engage in a closer exposition of all the topics and disputed questions, which were treated in a work of this magnitude, would carry us far beyond the scope of this memorial. And to give only a brief review of the more important ones would create a picture which would have little in common with the original. Consequently only a few, brief examples of his most important opinions could find a place here.

After finishing his review on the destiny of the Swedish people and with an eye directed towards the method of education of the upcoming generation, AGARDH lamented that the state, by taking over the educational system, had removed the rearing of children from the home to the school and also had removed, most notably, from the home the care, the cultivation of consciousness, and moral and religious formation. Furthermore, he lamented that the schools, in too great a degree, had excluded the factual, scientific subjects and had mostly concentrated the emphasis on formal, classical education. In these times, and to a lesser degree in the preceding ones also, AGARDH claimed to have found in these circumstances the reasons, even though the times weren't poetical, that Swedish education was mainly esthetical. And, finally, that here too was sown the seeds which had germinated into poorer tastes and poorer literature which more and more cut detrimentally into the areas of religion, morals, and science.

These views of AGARDH's were old ones. He had previously proposed vigorously these concepts on several occasions, such as during the great educational reform and in the preface to his botanical textbook. To him, the family was the greatest hearth for the moral and religious development of young men; schools should provide them with not only formal but, also, even scientific education, the former as a foundation for humanitarianism, the latter as a condition leading to factual knowledge which needed to be developed for the nation. "Together, arts and sciences make up the civilization of the state, not either one by itself; the country which worships art, but forgets science, will become a modern Italy, enchanting but oppressing." An education that lays early a foundation for a scientific enthusiasm in the lad or young man, will eventually create a scientific society, which instead of being detrimental to a formal education, would instead improve advantageously both real art as well as poetical creations.

It is with excitement that AGARDH described, according to his own concepts, the natural features of the Swedish landscape as it forms waves composed of the valleys and mountains or as it expanded out into the flatlands; its gloomy forests, smiling groves, murmuring brooks and lakes like mirrors; our old cherished mother, adorned with a few of the south's charms, but with all the seriousness of the north, not spiritually poor but economically so, with a stern mien, but smiling and generous, when her sons take care of her, but sufficiently rich, if she must, to arm them for victories in the fields of war or for peaceful pursuits; a stern educator and, thus, because of this sternness, so dear to AGARDH. For him, Sweden was a country little used, possessing great riches: the possibility of a great agriculture industry and, extensive, rich forests which, if cared for well, could become even more important, and hugh metal resources if only they could be used by skilled hands, and so on. But in order to mobilize all of these types of industries, there had to be a reform of the old in all of its entirety, the railroads, the other means of communications, and most of

all, an orderly system of monetary exchange for the internal extension of credit so that the great native wheel of industry would not stop or go at the whim of the foreign lenders.

With such thoughts for the betterment of the country and with beautiful hopes for its even higher development in the future in the expanse of civilization AGARDH sat in the twilight of his life still at his desk and gave the subject before him "freedom to develop itself in the light of the fire of love." However, his physical strength sank before his spiritual. He died on the 28th of January, 1859, after a rather sudden illness.

In his marriage to CHARLOTTA LINDSKOG who died in 1869, and whose father was a shopkeeper in Lund, AGARDH had two sons: JACOB GEORG, a professor at Lund, and RAGNAR who died in Stockholm at a young age. There were also two daughters.

Appendix

In conclusion, the following chronologically arranged summary is here given highlighting some of the more significant accomplishments, awards, honors, and other events in AGARDH's life; the majority of these have been taken from the above memorial by ARESCHOUG but with a few additions from CARLSSON'S (1918) biographical treatment in *Svenskt Biografiskt Lexikon*:

- 1785 Born, at Båstad, parents: GEORG MICHAELSSON AGARDH, Merchant in Båstad and AGNETA KRISTINA OLLMAN, daughter of JAKOB LINDSCHOUGH, Merchant in Lund, January 23.
- 1799 Enrolled at the University of Lund, October 5.
- 1801 Defended his thesis: **Quaestio physiol. quae et qualis est musculorum vis formam ossium mutandi**, Chairman J. SÖNNERBERG, October 31.
- 1803 Philological candidate, University of Lund, December 16.
- 1805 Philosophical candidate, University of Lund, May 18.
- 1805 Presented thesis: **Observationes in Methodum Tournefortianam a Cl. GUIART fil. Reformatam**. Chairman A. J. RETZIUS, May 29.
- 1805 Awarded Master of Philosophy, University of Lund, June 22.
- 1807 Docent (University Lecturer) in Mathematics, University of Lund, February 6.
- 1809 Traveled abroad through Denmark, North Germany, and Poland to Berlin.
- 1810 Appointed Associate Botany Demonstrator, University of Lund, August 25.
- 1811 Appointed Associate Professor of Economics, University of Lund, January 24.
- 1812 Proposed as third choice for a professorship at the University of Lund, January 7.
- 1812 Appointed Professor of Botany and Economics, University of Lund, September 9.
- 1816 Member of Värmland's(?) Science Society.
- 1816 Ordained as a Clergyman, March 6.
- 1816 Received as sinecures St. Peter's Cloister and Nöbbelöv's Parish, March 6.
- 1816 Appointed Vicar of his own Parishes, June 7.
- 1817 Member of the Royal Academy of Science.
- 1817 Auditor in the State Bank and Treasury Departments.
- 1817–1818 Member of the Ecclesiastical Estate of the Parliament as the representative for Lund Province.
- 1818 Member of the Patriotic Society.
- 1819–1820 Served as President of the University of Lund.
- 1821 Traveled abroad to Europe.
- 1823 Member of the Ecclesiastical Estate of the Parliament as the representative for Lund Province.
- 1824 Recipient of the Order of the North Star.
- 1824 Auditor in the Malmö Discount Bank.
- 1825–1828 Served as member of the committee for the study of the general schools, December 21, 1825–December 20, 1828.
- 1827 Traveled abroad to Europe.
- 1828 Member of the Science Society of Uppsala.
- 1829 Second choice for Bishop of Kalmar, October 7.
- 1829 Superintendent (Director) of the Loan Office of the Four Estates in Malmö.
- 1831 Elected to the Swedish Academy.
- 1833 Traveled abroad to Europe.
- 1834 Honorary Member of Värmland's Rural Economy Association.

- 1834–1835 Member of the Ecclesiastical Estate of the Parliament as the representative for Lund Province.
 1835 Appointed Bishop of Karlstad, March 21.
 1837 Received the Order of Bishop.
 1837 Awarded Knight of the Holy Cross of the Royal Order of the North Star.
 1840–1841 Member of the Ecclesiastical Estate of the Parliament as Bishop.
 1843 Auditor in the State Bank and Treasury Departments.
 1844–1845 Member of the Ecclesiastical Estate of the Parliament as Bishop.
 1845 Awarded Doctor of Theology.
 1847 Awarded Knight of the Order of the Royal Danish Dannebrog (The Danish Flag).
 1847–1848 Member of the Ecclesiastical Estate of the Parliament as Bishop.
 1856 Celebrated Jubilee Doctorate (50 years).
 1859 Died, in Karlstad, January 28.

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Note: Copies of the bibliography of C. A. AGARDH's phycological contributions prepared by the author can be ordered from the address beneath.

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