



**THE ANCIEN RÉGIME INSTRUMENTAL METEOROLOGICAL  
OBSERVATIONS IN BELGIUM  
OR THE PHYSICIAN WITH LANCET AND THERMOMETER IN  
THE WAKE OF HIPPOCRATES**

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Celui qui se propose de faire des recherches exactes en médecine, doit premièrement considérer les effets que chaque saison de l'année peut produire.

"Traité d'Hippocrate des airs, des eaux et des lieux", par Coray, Paris (l'An IX, 1800), I,1.

**Abstract**

The paper unravels the close connection that, from the end of the 17<sup>th</sup> century until well into the 19<sup>th</sup> century, brought together meteorologists and physicians into one common programme. This connection was based upon the works of the Greek physician Hippocrates, and particularly "Airs, Waters, and Places". The ancient doctrine underwent a strong revival in the 18<sup>th</sup> century and formed the basis of the founding of the "*Société Royale de Médecine*" in Paris. This society, under the direct guidance of the French government, launched a nationwide medico-meteorological enquiry. Its goal was to find the relationship between health, weather, climate and also the environment in order to understand the appearance and spread of illnesses, particularly the epidemics and epizootics.

The meteorological observations carried out by the physicians in the framework of the neo-hippocratic hypothesis form the cornerstones of the early meteorological observations in Belgium. Their importance in Global Change is highlighted because of their use in the climate reconstruction over the last hundreds of years.

## 1. Introduction

Since roughly twenty years, climatologists state that a climatic change is going on that cannot be labelled any more as a natural climatic change but is being attributed to the increase of greenhouse gases of anthropogenic origin in the atmosphere. With greenhouse gases are meant, in the first place, carbon dioxide but the latter one is followed by a pleiad of other gases. In order to cope with this point of view, the scientific community, backed up by the decision makers, combines its strength in climatological research along three main lines:

- Past climates: climate reconstruction,
- Present climate: climate monitoring
- Future climate: climate prediction.

In order to narrow the uncertainties that are inherently connected with climate modelling, it is necessary to reconstruct the past climates as well as possible in order to ascribe the part of the climatic change that is natural and the part that is greenhouse gases induced.

Climatic reconstruction can be carried out by means of a variety of data types that can be subdivided as follows:

- instrumental climatologic observations (temperature, atmospheric pressure, wind direction and speed, precipitation, snow depth, water level, ...)
- climate-related documents – the discipline sometimes called historical climatology (weather journals, travel journals, newspapers, ship's logs, ...)
- natural climate archives (dendrochronology, ice cores, deep sea cores, tephra layers, speleothems, pollen analysis, corals, sponges, ...)
- indirect or proxy data (levies, grain harvest data, vintage data, freezing of lakes and canals, ...).

It are precisely those early meteorological observations, many times carried out by physicians in the 18<sup>th</sup> century, that will be instrumental in the climate reconstruction. The paper focuses on the relationship that was

thought to exist between weather, climate, health, illnesses and environment and which, as a consequence, induced physicians to engage in meteorological observations in order to understand the spread of epidemics and epizootics.

## **2. The development of climatologic instruments and observational procedures**

The basic meteorological instruments were invented at the end of the 16<sup>th</sup> and in the 17<sup>th</sup> centuries but they have undergone a long-lasting and important development in the 18<sup>th</sup> and 19<sup>th</sup> centuries. It is known that the first thermometer was constructed by Galileo Galilei ca. 1590 and the first barometer by Torricelli in 1643.

At the end of the 18<sup>th</sup> century, the meteorological instruments started to become commercialized and to be spread among the richer bourgeoisie as can be proven by their presence in 'cabinets of natural history', inventories of private libraries and in household and probate inventories (see, e.g., Nuewens, 1779).

Still, without doubt, the Austrian Netherlands and the Prince-Bishopric of Liège, that together constituted approximately the present Belgium, possessed a low scientific profile. This had much to do with the forced emigration in the second part of the 16<sup>th</sup> century of a large part of the intelligentsia to the North (Blondeau, 1988), the fact that the country was much used by the Great Powers as 'the battlefield of Europe' (Johnson, 1936), while, later on in the 18<sup>th</sup> century, the Imperial Court in Vienna did not agree with several scientific proposals for financial reasons (Félix, 1987). Furthermore, the centuries-old University of Louvain had fallen in a kind of lethargy and one had to wait for the founding of the Imperial and Royal Academy of Brussels by the Empress Maria-Theresia in 1773 to see the awakening of a first co-ordinated scientific activity.

The long-lasting development in scientific instruments together with the low intellectual level in Belgium had consequences concerning the starting and the distribution of the early instrumental meteorological observations in this country. Indeed, one has to wait for more than half a

century compared to the neighbouring countries before the first known regular observations took place and even at the end of the *Ancien Régime* the number of scientifically oriented observers was rather low.

In the 18<sup>th</sup> century, the first attempts to standardize instruments and procedures occurred. Practically, the temperature scales proposed by Réaumur, Fahrenheit and Celsius became universally used. The process of standardization was continued throughout the 19<sup>th</sup> century and got much impetus when the National Meteorological Services (NMSs) were founded and ultimately when the International Meteorological Organisation (IMO) had its first meeting organised in Vienna in 1873.

Although 18<sup>th</sup> century meteorological observations are rather scarce in Belgium, they are of utmost importance for climatic change studies since they allow a calibration of historical climatologic information that spans a much broader period. Nevertheless, it remains a difficult task to compare 18<sup>th</sup> century observations with the ones of the second half of the 19<sup>th</sup> and of the 20<sup>th</sup> centuries.

It was precisely this search for early instrumental meteorological observations for use in climatic reconstruction that, again and again, physicians appeared, leading ultimately to the theme of this paper.

### 3. Hippocrates of Kos

Hippocrates of Kos (460-377 B.C.) was one of the Greek physicians who started a new empirical approach towards the theory and practice of medicine. Although some doubts may exist among the historians about the authorship of his entire work, known as the '*Corpus Hippocraticum*', those books dealing with the concept of weather and health especially "*Airs, Waters, and Places*", "*Aforismes*" and "*Epidemics I and III*" are by his hand.

Hippocrates conceived health to be an expression of the balanced interplay between the organism as a whole and its environment. It was an interaction between '*physis*' and environment as parts of the greater entity, life itself. He viewed '*dis-ease*' as a difficulty in adjusting to

adverse effects created by the environment. When Hippocrates wrote about the environment, he had in mind much more than weather, season and climate. He emphasized the importance to health and disease of water, place, topography, and orientation to sun and winds. In his "*Airs, Waters, and Places*", Hippocrates describes for the first time systematically the possible relationships between health and weather; he describes the environmental criteria of different cities in relation to health and illness, the weather conditions, the seasons, the epidemics, the relation between seasons and the medical treatment (Sargent, 1982; Cantor, 2001).

Hippocrates' view on the relation between weather and health can be divided into two parts: first, one dealing with the succession of the seasons characterised as cold/warm and dry/wet, and second, one that can be seen as the prototype of the '*medical topography*' that will so flourish in the 18<sup>th</sup> and largely also in the 19<sup>th</sup> centuries.

#### **4. The neo-hippocratic hypothesis**

From the end of the 15<sup>th</sup> century on, the works of Hippocrates knew many prints and in the late 17<sup>th</sup> century a strong revival of the Hippocratic beliefs took place. English and Scottish physicians such as Thomas Sydenham (1624-1689) and John Arbuthnot (1667-1735) provided new interpretations. Sydenham said that the atmospheric conditions play a significant role in the process of the illness, more precisely, he adopted the view that it were the atmospheric conditions that cause the epidemic constitutions. From these considerations, it is only a small step to Sydenham's programme of studying the correlation of the atmospheric conditions, the seasons and the illnesses. That interpretation and the revalidation of Hippocrates work is named the neo-hippocratic hypothesis. Sydenham's ideas received a large impact, and already, in his '*Opera omnia*' published posthumously at Geneva around the mid of the 18<sup>th</sup> century, many followers were making the connection between the occurrence of illnesses and the observations of the state of the weather (Sydenham, 1749).

Thomas Short (ca. 1690-1772) followed in Sydenham's footsteps and published a two-volume compilation work. *"A General Chronological History of the Air, Weather, Seasons, Meteors, in Sundry Places and different Times, more practically for the Space of 250 Years. Together with some of their most Remarkable Effects on Animal (especially Human) Bodies and Vegetables."* In his foreword *"Praelegomena to a General History of the Air and its Effects"* he explains one of his goals, namely the prevention of epidemics:

*"Of all the Diseases, Epidemics come often most unexpectedly, spread soonest, and are sometimes of the shortest Duration, though attended with the greatest Danger and Mortality, return seldom, and at uncertain times."* And he continues: *"In attempting the Cure of Epidemics, the late and present Winds, Air, Weather, Meteors, Food and Rise of the Disease, should not be forgotten."*

The neo-hippocratic hypothesis led the 18<sup>th</sup> century physician and natural scientist to investigate the relationship between climate and human health by associating the environmental factors with diseases, epidemics and epizootics. The action of the climate upon man is seen through the eyes of the physician as the effect of the air that one breathes.

In the Low-Countries, the neo-hippocratic hypothesis was promulgated by Herman Boerhaave (1668-1738), Petrus Van Musschenbroeck (1692-1761) and David-Hieronymous Gaubius (1705-1780) at Leyden University. Their influence in the Low Countries reached far into the 19<sup>th</sup> century. It was one of Boerhaave's most famous students, James Jurin (1684-1750), Secretary of the Royal Society at London who made the famous call for making meteorological observations. This call was basic for the existence of long time-series of medical-meteorological observations in the United Kingdom (Jurin, 1724; Manley, 1952; Rusnock, 2001).

This neo-hippocratic hypothesis dealing with the relationship between weather, climate health, illness and environment has strongly influenced the scientific thinking and the scientific projects for more than one-and-a-half century. Therefore, in the context of climatic changes, it is important

to understand how and why the 18<sup>th</sup> century physicians were dealing with weather and medical constitutions.

### 5. The '*Société de correspondance*' and the '*Société Royale de Médecine*' in Paris

It is legitimate to ask how this vision was implemented into a national project in France and what was the Belgian contribution to that project. In line with the concept of the French Académie Royale des Sciences, the French government took the initiative of founding a medical Correspondence Society (Anonymous, 1776) that soon evolved into the '*Société Royale de Médecine*'.

What were the immediate causes leading to that initiative? The seventies of the 18<sup>th</sup> century were marked by numerous epidemics and epizootics (Bruneel, 1979). Such epizootics also swept through our regions as can be seen from de Potter *et al.* (1875):

*"1769: de veepest woedde in 't Gentsche en op Hollandsch grondgebied - onmiddellijk werd er een wacht uitgezet die tot zending had den ingang van vee uit gemeld geweest te beletten;*

*Mei 1770: de plaag vertoont zich te St Winnoksbergen (Fr.) en neemt er snelle uitbreiding;*

*Juni 1770: ter hofstede van Pieter De Schodt, het vee wordt zonder verwijl afgemaakt, de plaag verspreidde zich als een loopend vuur in geheel de kastelnij van Veurne. Alle openbare veemarkten worden opgeschort, om de ziekte te beletten door te dringen werden al de bruggen te Pervijze werden afgetrokken en het zoogenaamde gezondheidsordon wordt ook naar 't Houtland uitgezet."*

In France the cattle pest broke out again in 1770-1771 and got a large distribution (Hannaway, 1972). In 1774, at the occasion of the import of a few infected skins a widespread epizootics originated and nearly one fifth of the livestock in Languedoc and in Gascoigne disappeared. These occurrences incited 'Minister' Turgot (1727-1781), concerned for the problems of prosperity and public health, who saw clearly the consequences of such catastrophic cattle pest at the national scale,



witnessing that local actions weren't successful to get the epizootics under control, to take suitable measures. Turgot had published a decree of the State Council on the 29<sup>th</sup> April 1776 that announced the foundation of a "*Commission de Médecine à Paris pour tenir correspondance avec les médecins de province, pour tout ce qui peut être relative aux maladies épidémiques et épizootiques*". Félix Vicq d'Azyr (1748-1794) was the secretary and all correspondence had to be addressed to him. This commission rapidly evolved to a full "*Société Royale de Médecine*" under the presidency of Joseph-Marie-François de Lassone (1717-1788). The patent letters date from the 1<sup>st</sup> of September 1778. This Society would explicitly take care of the research and the history of epidemics and epizootics. A yearly competition was held on the possible subjects of:

- (a) the medical constitution of the seasons, this means the daily nosological information coupled to meteorological observations during a medical year (*annus medicus*);
- (b) a treatise on a specific epidemics, or the constitution of a season during which particular illnesses occurred.

Louis Cotte (1740-1815) was appointed for the handling of the meteorological data. This already famous French meteorologist and observer was an Oratorian priest at Montmorency near Paris but also staid regularly at Laon. Cotte is the author of a two-volume meteorological standard treatise that refers at great length to the observations of the "*Société de Médecine*".

Different Belgian physicians, and to name only a few of them, among them the Foreign Associated Fellows: Dumont, First Physician of Prince Charles at Brussels; François-Xavier Burtin (1743-1818), Physician of the same Prince; Robert de Limbourg (1731-1792), Physician of the mineral waters at Spa, at Theux near Verviers; the Corresponding Fellows: Jean Baptiste Luc Planchon (1731-1781) at Tournai; Vandenhende, physician at Bruges; Charles-Louis-Maximilien Brabant (1740-1790), physician at Ghent; Joseph-Maximilien Duvier (1728-1796), physician at Mons; Jean Demeste (1746-1783) at Liège; Nicolas François Joseph Eloy (1714-1788) at Mons but also the agrometeorologist Eugène Joseph d'Olmen, Baron de Poederlé (1742-1813) at Brussels and at Saintes. All of them took part in this great endeavour and medico-meteorological reports were sent to the secretary in Paris.

Unfortunately, little has been conserved of this Belgian contribution in the archives of the Société médicale in Paris. Vicq d'Azyr mentions that Planchon at Tournai forwarded a series of tables with the constitution of the season and the prevailing illnesses since 1776 (Vicq d'Azyr, 1805). No trace of these reports could be found. The meteorological observations for the year 1781 by Demeste in Liège and those of de Limbourg at Theux for the month of June 1777 were the only ones that could be traced.

It needs to be said that a similar initiative was taken by David Gaubius at The Hague in The Netherlands under the name of "*Natuur- en Geneeskundige Correspondentie-Societeit in de Vereenigde Nederlanden*". This resulted in the publication of four important volumes holding medico-meteorological observations in The Netherlands (Anonymous, 1783; Geurts en van Engelen, 1983/1992).

In this way, the largest medical enquiry of the 18<sup>th</sup> century started; the project continued until 1794 (Desaive et al., 1972; Beaurepaire, 1994). The symbiosis of the approach of the epidemics, as well as by the French government as by the *Société Royale de Médecine*, led to a clear win-win situation. For the *Société Royale de Médecine*, the scientific views of those days on the subject of the relation between weather, climate, location, and epidemics based upon the classical theory of Hippocrates emerged as an organisational programme in which the French government believed to find its benefits in combating epidemics and epizootics. In this context, the *Société de Médecine* functioned as an advisory body for the French State and its representatives in the provinces for the elaboration of the outlined programme.

## 6. Examples of the neo-hippocratic hypothesis

In this section, examples, including a few counter examples, of the neo-hippocratic hypothesis will be given. The examples were taken from a slightly larger Belgium. Looking over '*De Schreve*', the so-named present-day borderline between Belgium and France, cases from the

Département du Pas-de-Calais and the Département du Nord are included in this paper.

As early as June 1757, the physician Pierre Joseph Boucher (1715-ca.1789) starts with the monthly publication in the "*Recueil périodique d'observations de Médecine, Chirurgie, Pharmacie, &c.*" of a long-lasting series of medico-physical observations (Boucher, 1757). This publication continues until the year 1789 (Schmeltz, 1891; Grenier, 1996). Later on, Boucher will also communicate his observations to the *Société Royale de Médecine* at Paris. As it suits well the ideas of that time, Boucher starts his first observations with a description of the climate in the town of Lille, in fact an early medico-topography of our region. Fully in the style of Hippocrates' "Airs, Waters and Places" Boucher describes the location of the town:

*"La ville de Lille est assise sur un terrain plat, dont le fond est presque tout marécageux: c'est ce qu'indiquent les eaux louches et le fond noirâtre de la Deule, rivière qui traverse cette ville du midi au nord."*

*"La ville se trouve percée par des belles & larges rues; et ses bâtimens ne sont pas assez élevés pour s'opposer au renouvellement convenable de l'air."*

*"Les brouillards y sont assez fréquens; ce qui, joint au pluies abondantes & suivies qu'amènent les vents de sud & d'ouest, rend les rhumes & les fluxions catharrales comme endémiques."*

Concerning the second item in his programme, namely the meteorological observations, Boucher tells us in a footnote that he reads his thermometer twice a day: in the morning between 6 and 7 o'clock, and in the afternoon between 2 and 3 o'clock, which can be used as a reasonable approximation for the daily minimum and maximum.

In connexion with the third item of his programme, Boucher tries to match the meteorological conditions with the reigning illnesses as can be seen in the following:

*"Les vents du Nord qui ont soufflé presque tout le mois, ont causé vers la fin du mois des fluxions de poitrine dangereuses, des maux de gorge*

*inflammatoires & des ophthalmies, qui ont rien exigé de particulier dans la cure. Peu de personnes ont succombé à ces diverses maladies."*

Similarly, J.-T.-B. Desmars, physician at Boulogne-sur-Mer, writes a treatise on the air, the soil and the waters of this harbour town (Desmars, 1759 & 1761). He continues in 1767 with a translation of Hippocrates' "Epidemics" from the Greek and adds several texts dealing with medical observations.

Jean Baptiste Luc Planchon, one of the Belgian corresponding fellows of the Société Royale de Médecine in Paris, writes in his "*Dissertation sur la fièvre miliaire*" that the de "*Vicissitudes de l'air, son humidité, sa froideur, les situations des lieux où l'atmosphère est humide & nébuleux, sont des causes qui disposent à cette maladie.*" (Planchon, 1772, 1778, 1794)

Théodore Augustin Mann (1735-1809), abbot of the English Carthusian monastery in Nieupoort and later permanent Secretary of the Theresian Academy in Brussels, carries out meteorological observations in Nieupoort (Mann, 1775-1777, 1780; Demarée *et al.*, 1994, 1998). In section IV "*Sur l'Influence du Sol & de l'Atmosphère de la Flandre maritime sur la santé des habitans: nature de leurs maladies*" of his Memoir on the natural History of the maritime Low-Countries Mann uses Hippocrates to describe the relation between the illnesses of maritime Flanders and its rivers, canals and ponds with their exhalations or miasmas.

*"On n'a guère douté, depuis Hippocrate, que la plupart des maladies, tant épidémiques qu'endémiques, ne tirent leur origine de la nature & des qualités du sol, du climat & des saisons. Si donc on avoit une connoissance exacte, fondée sur une longue suite d'observations, des bonnes ou mauvaises qualités de l'air, du sol & des eaux de chaque lieu, des saisons & leurs variations qui y regnent, du tempérament de ses habitans, on seroit à même de prévoir les maladies, & en quelque sorte de les prévenir."*

The same Academy held a competition in 1778 on: "*Décrire la température la plus ordinaire des saisons aux Pays-Bas, & en indiquer les influences, tant sur l'économie animale que végétale; marquer les*

*suites fâcheuses que peuvent avoir des changemens notables dans cette température, avec les moyens d'y obvier.*" Unfortunately, the award winning author, the physician Retz of Arras, didn't bring any new meteorological observations from Belgium but used exclusively already published data from The Netherlands (Retz, 1779).

Guillaume Daignan (1732-1812), a military physician at Saint Omer, writes a treatise on the salutary effects of brandy in the cold, humid, swampy Low Countries (Daignan, 1777). In the beginning of the 19<sup>th</sup> century, Daignan provides evidence in his long-lasting career of practices fully confirming the theory of Hippocrates recorded in the illnesses that reigned among the habitants of the maritime regions of the North (Daignan, 1807-1808).

Eloy, physician at Mons, not having kept a register of the daily variation of the atmospheric conditions and their influence upon the barometer and the thermometer, refers in his memoir on the dysentery in Hainault in the year 1779 to the meteorological observations carried out by de Poederlé (Eloy, 1780). Van Dorpe, physician at Courtrai, carried out himself meteorological observations for his study of the dysentery epidemics in 1794 (Van Dorpe, 1795).

Petrus Johannes van Bavegem (1745-1805), physician at Baasrode near Dendermonde, writes on the devastating fevers, named "*rotkoors*" and "*roodeloop*" that have reigned the last ten to twelve years in the Low Countries and have caused many victims. This author also makes the relation with the environment by stating "*Ook was het noodig voortaan alle Fabriquen, welkers Damp en Stank de Lugt besmetten, verre buiten de Steden wierden gebouwt.*" (Van Bavegem, 1788/1789/1790; Van de Velde, 1946; Velle, 1985, 1998). A similar remark was found in the meteorological papers of Baron de Poederlé when he describes an epidemic that occurred in Brussels and he noticed that the more densely inhabited popular quarters were hit more severely by the mortality; he ascribes this fact to the less good environmental conditions in the urban slums. Both of them can therefore be considered as environmentalists "*avant la lettre*".

## 7. Critical Voices on the neo-hippocratic hypothesis

Although the main stream of the researchers closely followed the neo-hippocratic thesis, a few critical voices were heard. These researchers dared to fly in the face of the project of the French government and its advisory body, the *Académie Royale de Médecine*.

One such a scientist was Abbot Rozier, editor of the leading journal in natural sciences "*Observations sur la Physique, sur l'histoire naturelle et sur les arts*". In an answer to Abbot Louis Cotte, he asks the question what these numerous meteorological observations that had already been carried out in many European countries since more than a century have contributed to the knowledge on the illnesses. His answer is nothing or nearly nothing.

*"De-là vient, que depuis les Traités sublimes d'Hyppocrate, de flatibus, de aëre, locis & aquis, on n'a pas fait un pas dans la découverte des causes de maladies, qu'on fait dériver de l'air. Que nous ont appris à leur sujet, ces nombreuses Observations météorologiques, faites, avec tant de soins, en Allemagne, en France, en Angleterre, en Italie, &c. depuis le commencement du siècle passé jusqu'aujourd'hui ? Rien, ou presque rien. On sait que l'air est très variable. A quoi ont-elles servi ? A grossir les volumes. Sydenham qui, en faisant ses observations, supposoit toujours, comme les autres, les principes de toutes les maladies qui deviennent épidémiques ou générales, préexistans dans l'air, fut forcé de convenir, à la fin de sa course, qu'on n'entendoit rien à toutes ses variations, à ses différentes constitutions, & qu'on n'en pouvoit rien conclure pour expliquer la formation de ces maladies."* *Observations sur la Physique, sur l'Histoire naturelle et sur les Arts, Par M. l'Abbé Rozier, Tome Septième, Février 1776, Paris, p. 102-103*)

In Belgium, Joseph Nicolas Comhaire (1778-1837), professor at the Medical Faculty of the *Université de Liège*, carrying out simultaneous medical and meteorological observations over a long time span and comparing them, concludes that the study sheds little light on that relationship and, therefore, there must be something other than the trials and tribulations of the atmosphere which cannot be seized by meteorological observations (Comhaire, 1828).

*“En comparant la constitution atmosphérique de ces années [1811-1824] avec les maladies qui ont régné, on arriverait à une conclusion peu favorable aux observations météorologiques : qu’elles ne nous éclairent que faiblement sur la production des maladies, témoin 1815. Il est encore quelque chose d’autre que les vicissitudes atmosphériques que nos instruments ne peuvent saisir.”*

## **8. Epilogue of the neo-hippocratic Hypothesis**

The French Revolution of the year 1789 represents a rupture in the history of the neo-hippocratic hypothesis, not so much for theoretical reasons but merely by the lack of materializing the support by the French government. The final blow occurred when the National Assembly abolished by the decree of 18<sup>th</sup> August 1792 all university corporations and learned societies. Among those are, what concerns meteorological observations, the “*Société Royale de Médecine*”, the “*Société Royale d’Agriculture de Paris*”, and our own “*Académie Impériale et Royale de Sciences et Belles-Lettres de Bruxelles*”.

This decision represents a rupture with the past; it is true that the French Republic and Empire founds new societies but those do not enjoy a long lifetime. At Brussels, the short-lived “*Société d’histoire naturelle*”, the “*Société de médecine, chirurgie et pharmacie de Bruxelles*”, the “*Société libre des sciences et des arts, d’agriculture et de commerce*”, and the “*Société d’émulation des sciences physiques, chimiques et naturelles*” and, at Antwerp, the “*Genootschap ter Bevoordering van de Genees- en Heel-Kunde*” were founded. New scientists, like J.-B. Van Mons, appear on their lists of members but a few scientists of the “*Ancien Régime*”, like de Poederlé, du Rondeau, Caels, etc. have survived the radical political changes.

Duval, physician at the military hospital in Brussels, carried out medicometeorological observations according to the Republican calendar (Duval, An VIII/1799).

The physician Van Aenvanck publishes in the Memoirs of the "*Genootschap ter Bevoordering van de Genees- en Heel-Kunde*" on the influence of the humus on the atmosphere as a particular origin of the decreasing fevers (Van Aenvanck, An VIII/1799). In this paper he refers explicitly to the works "Airs, Waters and Places" and to "Aphorisms" of Hippocrates.

*"De oude Geneeskundigen hebben groot aandacht genomen op den invloed van den logtkring, op de Dierlyke zamenstelling en byzonderlyk die van het Menschen ligchaam. Hippocrates heeft daar van een byzonder Boekdeel geschreven (Aëribus, aquis et locis liber), en heeft daar ook in zyne Aphorismen op verscheide plaatsen van gewag gemaakt."*

## 9. New allies in the neo-hippocratic hypothesis

Under the French Republic and Empire, a new science, namely statistics, made its entry in the framework of the neo-hippocratic hypothesis. Statistics became a political weapon for the Republic and the Empire. The French government requested that for each French Department (thus including the Belgian Departments), a large amount of statistical data should be collected. Among these data, also topography, the territorial division, the climate, the meteorological phenomena and the reigning illnesses were included. The French botanist and meteorologist Jean Baptiste de Monet de Lamarck (1744-1829) described in the "*Annales de statistique*" edited by Louis Joseph Philippe Ballois (1777-1803) the meteorological aspects that the "*Mémoires statistiques des Départements*" needed to fulfil.

For the Belgian Departments, data from the *Ancien Régime* have been used, as example those by Jean Chevalier, Théodore-Augustin Mann and Baron de Poederlé in the memoir of the Dyle Department, but usually the Prefects requested the newly founded Central Schools of the department capital to carry out meteorological observations. It is noticed that the neo-hippocratic hypothesis although not turned down becomes second-class. These statistical memoirs are then continued later under the form of "*Annuaire statistique*" or "*Almanach du Département*".



As an example of the neo-hippocratic hypothesis in the new context, the following is written in the *“Annuaire statistique du Département du Nord, Pour l’An XI de la République (1802-1803)”*:

*“Calendrier. Maximum et minimum mensuel et leurs dates d’apparition du baromètre et du thermomètre à Lille, An X. Douai et Avesnes, observations météorologiques.”*

*“Analyse des Observations météorologiques, d’après le système de Lamarck, faites dans le courant de l’An X, sur trois points du Département du Nord, savoir: par les Citoyens Saladin, Bibliothécaire de l’Ecole Centrale à Lille; Taranger, Médecin à Douai; Godefroy, Médecin à Avesnes; avec notice de la constitution médicale, observée mois par mois par ces deux Médecins.”*

During the Dutch era in Belgium (1815-1830) the meteorological observations become even more rare. The context of the meteorological observations changes once more, and in the Dutch style, agro-meteorology, meaning meteorology serving the purpose of agronomy, is now stressed.

Far into the 19<sup>th</sup> century, initiatives are taken in France but also in the newly independent Kingdom of Belgium that appeal to the neo-hippocratic hypothesis although science had already taken other paths. This is illustrated by the numerous medical topographies that arose in nearly every Belgian administrative district. Such an example is the work by J. Vrancken, physician at Courtrai, which has been given the award for the year 1852 by the Medico-surgical Society of Bruges (Vrancken, 1855)

*“Hippocrate est le premier qui a remarqué que: la forme et la maladie des hommes suivaient en très-grande partie la nature du pays qu’ils habitaient. (De aëre, aquis et locis)”*

Around the mid of the 19th century, the motivation for carrying out meteorological observations were agro-meteorology, commerce, maritime and transport over land, hydraulics (sluices, dams, waterways) and to a lesser extent the neo-hippocratic hypothesis. However, in 1865,

the French Minister of War asked that meteorological observations to be carried out in the military hospitals of Dunkirk, Lille, Cambrai, Valenciennes and Maubeuge, to name only those from the Département du Nord. By this order, the Minister made the circle round and joined the ideas of military physicians from the same region more than one hundred years before.

In his edition of the collected work of Hippocrates, Emile Littré (1801-1881) could allow critics on Hippocrates and this mainly from the point of view of statistics. He criticized Hippocrates for not mentioned the methodology to control his statements so that his statements couldn't be verified. The 19<sup>th</sup> century science namely requested a statistical verification of the statements. The last convulsion of the neo-hippocratic hypothesis took place in New South Wales in Australia where the last scientific edition of "Airs, Water and Places" was published in 1874. Since then the hypothesis still survives, but under different form and content, in medical bioclimatology and in meteotropy but then as indirect causes and additional stress factors in a more complex structure of the illness.

## 10. Conclusions

The neo-hippocratic hypothesis as regards the relationship between weather, climate, health and environment led to a number of far reaching consequences:

(a) The Hippocratic revival resulted in a pleiad of editions of the master's works starting from the end of the 15<sup>th</sup> to the end of the 19<sup>th</sup> centuries (Miller, 1962).

(b) In order to quantify the weather conditions, physicians started to carry out meteorological observations. The latter was made possible by technological advances of the 17<sup>th</sup> century where the modern meteorological instruments were born. It may further be accepted that by the second half of the 18<sup>th</sup> century such instruments became quite common.

(c) The neo-hippocratic hypothesis led to an interest beyond measure in human and animal epidemics (Hannaway, 1972). Observations on reigning epidemics and epizootics were collected together with meteorological observations by physicians.

(d) It was rapidly understood that in order to better understand the phenomena, national and even international programmes should be started. Several institutions having governmental support like the *Société de Médecine* in Paris under the leadership of Vicq d'Azyr took initiatives for large observational programmes by creating nationwide networks.

(e) Based on their observations, physicians imposed on themselves the task of writing essays on medical topography of a region or a town, describing climate, environment, and medical conditions and reigning diseases. Such research was combined in the 19<sup>th</sup> century with the new science of statistics.

(f) The influence of Hippocrates' work "*On Airs, Waters, and Places*" led to a quest for cures, all of them involving one of the Greek traditional elements. Examples of such cures were the prescriptions by physicians of horse riding, and stays at the British or Mediterranean shores to heal tuberculosis. At the same time, 18<sup>th</sup> century medicine started to promote visiting the Spas by studying the chemical qualities of their waters (Kevan, 1993).

In the 19<sup>th</sup> century it became clear that the programme had failed. This was mainly due to the discovery of the specific vectors of epidemic diseases by Koch, Pasteur and many others but it can also be credited to the advances in meteorology and statistical climatology. On the basis of the meteorological observations carried out in the third quarter of the 18<sup>th</sup> century in the network of the *Societas Meteorologica Palatina*, H.W. Brandes (1777-1834) discovered in 1820 the patterns and rules of atmospheric circulation in the mid-latitudes (Kington, 1980, 1988). This led the Dutch meteorologist Buys-Ballot to discover his law that is fundamental in weather forecasting.

However, in the framework of Global Change the early meteorological observations, carried out in the above-mentioned context are of utmost

importance since they are instrumental in the reconstruction of the climate of our region for the last 250 years. The EU IMPROVE project (Lachaert, 1999; Demarée *et al.*, 2002) allowed to construct a first version of a daily temperature time-series for Central Belgium using for the earliest part observations carried out by the physicians Guillaume-Lambert Godart, the dean of the Belgian meteorologists, and Victor François, at Mons. Godart studied medicine at several European universities, among them Leyden, where in the wake of Boerhaave and Van Musschenbroeck he came in contact with the neo-hippocratic hypothesis.

What is the vision of a nowadays scientist on the neo-hippocratic hypothesis? At the most, he will recognize the meteorological environment as a stress factor in illness. He would reject the hypothesis on the basis of an oversimplification of the concepts of seasons – Hippocrates lived in the Mediterranean region – and there was no reason to construct a universal theory based on these conditions. Another reason would be the very strict straitjacket into which the observations must be put in order to fulfil the hypothesis (Sargent, 1982), and, last but not least, the lack of proof and the circular reasoning involving hypotheses and proofs.

Worrying for the modern scientist is the long lifetime of the hypothesis remaining very much alive among scientists and decision-makers. To express it clearly, the scientific programme dealing with the neo-hippocratic hypothesis has failed because no clear difference was made between what was really known and what was expected under the assumed hypotheses.

### **Acknowledgements**

The author is particularly grateful to all members of the Belgian EU IMPROVE team: Prof. Dr. Erik Thoen (UGent) - *Collega proximus*, Drs. Pieter-Jan Lachaert (UGent) and Lic. Tania Verhoeve (UGent, KMI, Belgocontrol), and also to Lic. Stefanie Vanelslander (UGent) and Dr. Martine De Reu (UGent) for their precious help and cooperation in this

endeavour. Sincere thank is also expressed to the librarians and archivists of the many Libraries and Archives visited over the last 15 years.

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ΙΠΠΟΚΡΑΤΟΥΣ

ΠΕΡΙ

ΑΕΡΩΝ, ΥΔΑΤΩΝ, ΤΟΠΩΝ.

TRAITE D'HIPPOCRATE

DES AIRS, DES EAUX ET DES LIEUX;

TRADUCTION NOUVELLE,

Avec le texte grec collationné sur deux manuscrits, des notes critiques, historiques & médicales, un discours préliminaire, un tableau comparatif des vents anciens & modernes, une carte géographique, & les index nécessaires.

PAR CORAY,

Docteur en Médecine de la ci-devant Faculté de Montpellier.

TOME PREMIÈRE



A PARIS,

DE L'IMPRIMERIE DE BAUDELOT ET EBERHART.

LAN IX. (1800).

Figure 1. Titelpage of the Greek-French edition of Hippocrates' work "On the Airs, Waters, and Places" by the French physician Coray printed in Paris in 1800.