

# The true identity of Pascal's mite and the diachronic use of *ciron*

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## Original research

### ABSTRACT

The identity of Blaise Pascal's mite is examined. Linguistics, morphology, habitat and size reveal that Pascal's mite is not *Acarus siro* L., as usually thought, but *Sarcoptes scabiei* (L.). The diachronic use of the popular term *ciron* is explored from a number of different perspectives. In everyday language and in Pascal's time, the term used to designate *A. siro* L. was *mite* (used singly, in English and French) and not *ciron*, a word restricted to the scabies mite; its use is also investigated. The classification of mites in the 17<sup>th</sup> and 18<sup>th</sup> centuries is reviewed.

**Keywords** *Sarcoptes scabiei* (L.); *Acarus siro* L.; Blaise Pascal; *ciron*; *mite*

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To Profs Ph. Lebrun (†) & Y. Coineau

## Introduction

Blaise Pascal's *Pensées* was published, after his death, in 1670, but was written at an epoch when the microscope became a recreational tool for laypersons (Arminitor, 2011). It was also drafted at a time when the concern for scientific rigor combined with an amazing freshness and austere piety (Bouvier, 1996).

Pascal (1623–1662, France) was completely educated by his father and is considered a child prodigy. When he was eleven, he delivered a thesis about the beginning and discontinuation of sound and, at sixteen, he wrote an essay on conic sections. This “*effrayant génie*” (“scary genius”), as named by Chateaubriand (1802), is renowned as a mathematician (early pioneer in the fields of game theory and probability theory, Pascal's triangle), physicist (the unit of pressure, the pascal, is named after him), inventor (the pascaline is the world's first fully functional mechanical calculator), philosopher (Pascal's wager) and writer. Nowadays, he forms part of the French Baccalaureate Literary Study Program.

Although it is not an acarological book, Pascal's *Pensées* is of interest to acarologists as he illustrated the infinitesimally small with the familiar *ciron*, the French word used in the past to designate a mite: “*Qu'un ciron, par exemple, luy offre dans la petitesse de son corps des parties incomparblement plus petites, des jambes avec des jointures, des veines dans ces jambes, du sang dans ces veines, des humeurs dans ce sang, des gouttes dans ces humeurs, des vapeurs dans ces gouttes...*” (Pascal, 1670: 173–174, translation by Boitano (2002): “Let a mite show him in its minute body incomparably more minute parts, legs with joints, veins in its legs, blood in the vein, humours in the blood, drops in the humours, vapours in the drops...”). Pascal's mite is abundantly cited in recent books: Espagnat (1986), Morali (2004), Jacquard (2004), Onfray (2014), Godin (2016), from astronomical to philosophical works.

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But what was the mite mentioned by Pascal and others? And what does *ciron* and its relative terms mean? Traditionally, Pascal's *ciron* is identified as the cheese mite, *Acarus siro*: Kemna (1904: LII), Molina *et al.* (1975), Sève (1992: 60), Coineau *et al.* (1997: 69), Thibault (2003), Maggiori (2004, 2005), Beurey (2007: 166), Boutibonnes (2008), Sanromán (2009), Bessot *et al.* (2011: 610), Bessot and Pauli (2011: 230), Mailleux *et al.* (2011: 8), Lebrun (2013: vii), Drouin (2014a: 87; 2014b: 378), McConnell (2015), Godin (2016), Mauduit and Chantal (2017), Habbad (2018), Shimano (2018). References cited cover a wide range of documents, from newspapers to textbooks, from medical publications to teacher's books, and from political pamphlets to nature journals. They demonstrate a wide use of the assignation. The identification is even repeated in electronic encyclopedia (Chubret *in Wikipedia*, 2018), sources including several anonymous sites: e.g. anonym (2018).

## Material and methods

The true identity of Pascal's mite is elucidated by consulting the 16<sup>th</sup> and 17<sup>th</sup> century dictionaries and encyclopedias, i.e. primary sources. Incunables, books and other documents published at that time, or issued earlier, were also scrutinized. Electronic versions of publications were used, for instance from the *Bibliothèque nationale de France*. The optical character recognition (OCR) was used whenever possible. Due to lack of space, some references are not given; for instance, Mersenne, Pascal' mentor in the sciences, cited at least 4 times the *ciron*, but only one reference is mentioned.

There may be marked differences between successive editions (e.g. Malebranche, Mellema, Montaigne). Therefore, the *editio princeps* or the oldest available edition was preferred. Variants differed depending on the epoch, language and countries: *ciron*, *cyrone*, *süren*, *syrone*... the original noun was maintained. The term *ciron* also is a patronymic, a French commune, a river... The meaning may be affected by regionalisms: “*cironné*” *sensu* “worm-eaten” is a typical helvetism (Rey, 1998); this regionalism does not apply to cheese crust.

## Results

Results are presented in four parts. The first and longest concerns the vernacular term and its variants, *ciron* (glossaries and dictionaries of the 16<sup>th</sup> and 17<sup>th</sup> centuries, the diachronic meaning of the word *ciron*, its metonymic use, its origin, its popularity, and its symbolism). The second domain involves the medical word *syrone* and its variants (the school of Salerno, the school of Montpellier, other approaches). The last parts are devoted to the cheese mite and the classification of mites in the 17<sup>th</sup> and 18<sup>th</sup> centuries.

### A popular approach

#### French glossaries and dictionaries of the 16<sup>th</sup> and 17<sup>th</sup> centuries

Pascal was not an acarologist, nor was he a physician as were Bonomo and Mouffet. How did French dictionaries of the time define a *ciron*? All French dictionaries of the 17<sup>th</sup> century took the term *ciron*, from the Nicot's *Thresor de la langue françoise*, a document that played an important role in the development of French lexicography, to the 1<sup>st</sup> edition of the dictionary published by the French Academy. They all described the habits of the scabies mite (Table 1). The inclusion of the word *ciron* in the dictionary released by the French Academy is highly interesting as the dictionary banished terms which rarely entered the spoken language (Ernst, 2015: 87). Technical terms were considered disgraceful and relegated to *Le Dictionnaire des Arts et des Sciences* compiled by Thomas Corneille (Rouleau *et al.*, 2006).

Even better, the bilingual dictionaries of the previous century also reported the term *ciron* and, from 1650, again referred to the scabies mite (Table 2).

**Table 1** Definition of *ciron* in some French dictionaries of the 17<sup>th</sup> century. The original spelling and formatting attributes are maintained in original quotations. Tentative translation or paraphrase in contemporary English.

Source	Original definition	Paraphrase
Mellema (1602: n.p.)	Vn Ciron, <i>Een sierken</i>	A ciron, Dutch equivalent
La Porte (1602: 86)	Ciron. <i>Grateleux, demangeant, petit, gallé, traceux, menuet ou menu, vermelet, galonné, fort porté en amignotant.</i>	Ciron. <i>Scabiousus, itching, small, scabious [?], tracing, minute or tiny, vermiform, gallooned, [?].</i>
Nicot (1606: 125)	<b>Ciron</b> , m. acut. Est une espece de petit ver rond et blanc, au reste d'une petite tache noire qui l'enditte quand on le veut tirer, engendré d'humeur acre et aduste en divers endroits de la personne, mais plus communément és mains, qui ronge et fait demanger où il est concréé.	<b>Ciron</b> , m. acut. Is a kind of small round white worm, in the bottom of a small black scar that exhibits when it is to be withdrawn, begotten acrid humor and adust in various places of the person, but more commonly on the hands, which gnaws and itches where it forms.
Oudin (1607: n.p.)	<i>Un ciron, arador de la mano.</i>	<i>Un ciron</i> , Spanish equivalent.
Cotgrave (1611: n.p.)	Ciron: m. <i>A Hand-worme.</i>	Ciron: m. <i>A handworm.</i>
	Mais dont me vient ce ciron icy entre ces deux doigts? <i>But whence comes this worme betweene these two fingers?</i>	But where does this ciron come from between these two fingers?
Oudin (1627: 77)	Un ciron, un pedicello, arador de la mano.	Un ciron, Italian and Spanish equivalents
Monet (1635: 211)	Ciron, le moindre de tous les animaus, qui s'angeandre an la Cire, an la chair humaine, & autre part : hoc Acari, eos, ios. hic Acarus,ri. Aristotle quinto de hist. animalium, cap.tricesimo, secundo.	Ciron, the smallest of all animals, born in wax, in human flesh & elsewhere : hence Acari, eos, ios. hence Acarus,ri. Aristotle quinto de hist. animalium, cap.tricesimo, secundo.
Oudin (1655: 122)	Ciron, <i>pilucello, pellicello, bacolino, setola.</i>	Ciron, followed by Italian terms.
	Cironniere, <i>quantità di baccolini nelle mani.</i>	Cironniere, many cirons on the hands.
Pouvreau (1663: n.p.)	Cigarra. Ciron	Basque equivalent. Ciron
	Cigartsua. pleine de cirons.	Basque equivalent. Full of cirons.
Anon. (1677: 150)	Ciron, m. Sedicello, che nasce nella maria, pedicello	Ciron, m. Italian equivalent, born in the hands
Miege (1677: n.p.)	A hand-worm, <i>un ciron.</i>	English equivalent, <i>un ciron.</i>
Richelet (1680: 1, 140)	Ciron, s. m. Petit ver rond & blanc qui est engendré d'une humeur acre qui s'attache principalement à la main & qui cause une démangeaison.	Ciron, m. n. Small worm, round & white, generated with acrid humor which attaches mainly to the hand & causes an itch.
Furetière (1690: n.p.)	Ciron. s. m. Tres-petit animal qui s'engendre sous le cuir, sous lequel il se traîne & rampe en le rongeant petit à petit. Swammerdam dit que le ciron sort tout parfait de son œuf, & qu'il croist ensuite peu à peu. Il cause une grande démangeaison & grattage. Le microscope nous fait découvrir plusieurs parties en un ciron. Mr. Gassendi en observant un ciron, l'a vu émettre.	Ciron. m. n. Very small animal which reproduces under the skin, where he creeps and crawls and gnaws it step by step. Swammerdam said that the ciron hatches everything perfect and grows gradually. He causes itching & mange. The microscope shows us several parts in a ciron. Mr. Gassendi watching a ciron saw him defecating.
	Ciron, signifie aussi la petite ampoule qui vient à l'occasion du ciron, à force de gratter la peau. On perce des cirons avec une espingle.	Ciron also means the small blister caused by the ciron by scratching the skin. We burst cirons with a needle.
Dictionnaire de l'Académie 1, 1 <sup>re</sup> éd. (1694: 192)	Ciron. s. m. Sorte de petit ver, qui s'engendre entre cuir & chair & qui est presque imperceptible. Il n'est pas plus gros qu'un ciron. Tirer des cirons avec la pointe d'une épingle.	Ciron. m. n. Kind of small worm, which reproduces between skin & flesh & which is nearly inconspicuous. He is not larger than a ciron. Extract cirons with a needle.
	Il signifie aussi, La petite ampoule qu'un ciron fait venir à la main, ou ailleurs. Percer un ciron. Crever des cirons.	It also means the small blister that a ciron causes on the hands or elsewhere. To burst a ciron. To blow a ciron.

Last, Power (1663: 22), an English physician, Rohault (1671: 145), a French physicist, and Ozanam (1694: 162), another French mathematician and also popularizer, even stated that the *ciron* had the back covered with scales, a feature that definitely excludes the cheese mite with a smooth back.

### The diachronic meaning of the word *ciron*

In medieval Europe, glossaries with equivalents for Latin words in vernacular or simpler Latin were in use. Over the course of the 16<sup>th</sup> century, successive Calepino's dictionaries were published, originally as a monolingual Latin work, and then enlarged to become multilingual glossaries. The French term *ciron* was then a simple translation of the Latin *acarus* and the translation resulted in a synonymy between the two terms. The translation applies also to the Old German *seuren* (cf Frisius, 1616: 8).

Accordingly, *ciron* and *acarus* were synonyms in the 3<sup>rd</sup> edition of Robert Estienne's *Dictionarium latinogalicum* (1552: 6), in Dupuys' dictionary (1573: 134) as well as in Nicot's dictionary (1584: 134) and Stoer's dictionary (1593: 172). Similarly, the two terms, *syrone* and *acarus*, were used synonymously by Mouffet who titled his chapter "*De Syronibus, Acaris, Tineisque animalium*" (Mouffet, 1634: 266). Synonymy between *sierkens* (*ciron* in Middle Dutch) and *acarus* was also acknowledged by Swammerdam (1669: 3, margin note). In Pascal's time, the term *ciron* was restricted to a single species, which lived between the flesh and the skin, particularly around the hands (Duret, 1594: 159; La Mothe Le Vayer, 1648: 641) and already found in John Palsgrave's *Lesclaircissement de la langue françoise* (1530: 290). This monospecific sense was still used in Ludwig's trilingual dictionary with the translation 'ciron–hand worm–seur' (Ludwig and Rogler, 1763: 1015).

In Pascal's time, *Sarcoptes scabiei* was common and received many vernacular names

**Table 2** Definition of *ciron* in the French dictionaries of the 16<sup>th</sup> century. The original spelling and formatting attributes are maintained in quotations.

Source	Original definition	Paraphrase
Palsgrave (1530: 290)	Wormē in the hand — <i>ciron</i> s. m.	Worm in the hand — <i>ciron</i> m, n.
Estienne (1539: 90)	Ciron.	Ciron.
	<i>Vng ciron, Acarus</i>	<i>Vng ciron, Acarus</i>
Estienne (1552: 6)	Acarus, acari, m. g. <i>Vn ciron</i> .	Acarus, acari, m. g. <i>A ciron</i> .
Thierry (1564: 115)	<i>Vn Ciron, Acarus. [Vermiculos seu teredines quibus manus nostrae potissimum infestantur. Chirones vocamus Chirons από τῶν χειρῶν, hoc est à manibus.]</i>	A Ciron, Acarus. Small worm or boring-worm which can infestate on our hands. We call them <i>Chirones</i> . <i>Chirons</i> Greek text meaning on the hands, from the Greek word meaning hands.
Dupuys (1573: 134)	<i>vn Ciron, Acarus. Vermiculos seu teredines quibus manus nostrae potissimum infestantur, Chirones vocamus</i>	A Ciron, Acarus. Small worm or boring-worm which can infestate on our hands. We call them <i>Chirons</i> .
Nicot (1573: 132)	Chiron, <i>voyez Ciron</i>	Chiron, <i>see Ciron</i> .
Nicot (1573: 134)	<i>un Ciron, Acarus. Vermiculos seu teredines quibus manus nostrae potissimum infestantur, Chirones vocamus, chirons από τῶν χειρῶν, hoc est à manibus</i>	<i>a Ciron, Acarus. Tiny worms or grubs that can infest our hands, we call them Chirones, [see above].</i>
Meurier (1574: n.p.)	<i>Vn ciron, m. een sierken</i>	A ciron, m. <i>Dutch equivalent</i> .
Calepino (1586: 18)	Ācārūs, ri. {άκαρος. Gall. <i>Petit vers qui naist dedans la cire, ou ciron</i> . Ital. Il tarletto, che nasce nella cera, és il pedicello ò volgarmente pidocchietto. Germ. <i>Ein milb dic im wachs wächst</i> . Hisp. <i>El arador</i> . Angl. A mitte.}	Ācārūs, ri. {G. Small worm that takes birth in wax, or ciron. Ital. The tarletto, it takes birth in wax, it is the pedicello, or vulgarly pidocchietto (it. name for the scabies mite). Germ. <i>A mitre that takes birth in wax</i> . Hisp. <i>Mite in Spanish</i> . Angl. A mitte.}
Stoer (1593: 172)	<i>Un Ciron, Acarus. Vermiculos seu teredines quibus manus nostrae potissimus infestantur. Chirones vocamus. Chirons, hoc est à manibus.</i>	A Ciron, Acarus. Small worm or grubs that can infest our hands. We call them Chirones. <i>Chirons</i> , [a word that] comes from hands.

that varied with regions: *Cigarra* in Basque (Pouvreau, 1663: n.p.), *siere* or *sierken* in Dutch (Meurier, 1574: n.p.; Mellem, 1602), *hand-worm* (e.g. Cotgrave, 1611: n.p.; Miege, 1677: n.p.) or *wheale-worm* (Mouffet, 1634: 266) in English, *ciron* in French (e.g. Mouffet, 1634: 266), *Süren*, *Seur* or *Seuren* in German (e.g. Platter, 1608: 966; Frisius, 1616: 8; Mouffet, 1634: 266), *bacolino*, *sciro*, *sérola*, *pellicello*, *pidocchietto* or *pedicello* in Italian (Aldrovandi, 1602: 544; Mouffet, 1634: 266; Calepino, 1586: 18; Oudin, 1655: 122; Antonini, 1743: 128), *arador de la mano* in Spanish (Oudin, 1627: 77), *sciros* in Taurini (Mouffet, 1634: 266), *brigans* in Valcoses and in Gascony (e.g. Mouffet, 1634: 266; Aubert de La Chesnaye Des Bois, 1759: 337), and *chirones*, *syrones* or *sirones* in medical Latin (Mouffet, 1634: 266) and in English (Bailey, 1736: n.p.).

Over time, however, the term *ciron* was assigned a broader meaning (e.g. anonym, 1695) and referred to a group with several species corresponding to the genus *Acarus* defined by Linnaeus (e.g. Aubert de La Chesnaye Des Bois, 1759; Geer, 1765; Valmont de Bomare, 1775; Olivier, 1791).

Finally, *ciron* meant all mites. The famous French popularizer, J.-H. Fabre, still used *ciron* to designate mites in one of his best-known books (Fabre, 1875). Within a syntagma, it may refer to a specific mite: for instance, the *Ciron rutilant des savanes* was identified as a *Trombicula* sp. by Marc André, a founder of this journal (Sevenet, 1936: 60) and the expression is still used today (Euzéby, 2008: 14). Other recent examples of syntagma are provided by Loschiavo (1984), Mills (1990) and Loiselle (1999). The examples above illustrate the transition from a monospecific assignment of the word *ciron* to a widest use. A similar transition is also observed with the Greek noun ἄκαπτι used by Aristotle.

### The metonymic use of the word *ciron*

The metonymy of *ciron* is a figure of speech in which blisters in the skin are designated. This metonymic transfer is already found in Sarrasin's *Le Roman de Hem* written around 1278 (Rey, 1998: 762). It is the meaning used by the "Doctor Helveticus", Paracelsus (1493/4–1541), who designated "pimples or boils on the hands" (Waite, 1894: 383). The metonymic sense is found during the 17<sup>th</sup> century (Table 1) and continues in the next centuries (Antonini, 1743: 128; Daubenton, 1753: 492; Boissier de Sauvages de Lacroix, 1763: 23; Adams, 1807: 305; Littré, 1863: 628). A similar metonymy concerning sirones is used in medical Latin (Rulandus, 1612: 436; Dolæi, 1689: 1528; Blancardi, 1705: 298) and in English (Bayfield, 1662: 101; Cooke, 1685: 212; Bailey, 1736: n.p.; Bailey, 1883: 164; Rulandus, 1893: n.p.). This sense clearly indicates the scabies mite and not the cheese mite. Another transfer concerns the hands that are *cironnierre*, hence the English name (hand-worm) as well as the Spanish expression (*arador de la mano*).

### The popularity of the word *ciron*

Pascal was not the first and only philosopher to use the *ciron* to illustrate his ideas. In the previous century, Montaigne used the mite image twice (no citation in the first edition of his essays published in 1580, once in the 1588 edition, twice in the posthumous edition). It was perhaps by reading Gassendi (1592–1655) that Pascal adopted the mite image to illustrate the infinitesimally small (Rochot, 1944). Indeed, the term *ciron* was abundantly cited by Gassendi (Bernier, 1678: 66, 143, 145, 163) and his observation was even reported by dictionaries (see La Furetière in Table 1). Du Roure (1654: 17), Malebranche (1674: 41–1677: 45–46), and La Grange (1682: 42) were other philosophers of Pascal's time citing the mite. An alternative approach, also initiated in the 16<sup>th</sup> century, consisted of comparing the ciron to the elephant or to another big animal: Bodin (1577: 9), Montaigne (1588, 1598), Descartes (1647), La Bruyère (1699: 453–454) and more than 30 other authors of this time.

The ciron was even sufficiently known to serve as a reference species to describe insects causing itchy feet and hands (Léry, 1578: 181; Pyrard, 1619: 204; Laet, 1640: 489; La Chesnaye-Desbois, 1759: 360).

Actually, the term was very popular in France and had already appeared in the previous century, for instance in famous Rabelais' novels: “*Enay qui fut tres expert en matiere de oster les cyrons des mains*” (Rabelais, 1532: 11). The English equivalent depends on the translators: “Who begat Enay, who was very expert in taking the little Worms out of the Hands” (Smith, 1893: 213) or “Who begat Enay, the most skilful man that ever was, in matter of taking the little worms (called cirons) out of the hands” (Urquhart and Motteux, 1935: 292). The word *ciron* was repeated in *Le tiers livre* published in 1546 and in *Le quart livre* released shortly before his death. The term is also found in a poem by Ronsard (1557: 35), sometimes called the ‘prince of poets’: “*Un ciron qui souvent entame / La peau dotüillette de ma-Dame*”. What is noticeable is that both authors, Rabelais and Ronsard, referred to the scabies mite and not to the cheese mite.

The term was featured in *Les Folles entreprises* released in 1505 by Pierre Gringore, poet and playwright (Héricault and Montaignon, 1858: 35) and in *Le droict chemin de musique* by Bourgeois (1550), composer and music theorist. The Latin equivalent was also used by Scaliger, a philosopher and man of science who spent a major part of his career in France, and synonymies were given: “*Acaris. Garapates. Pedicellus. Scirus*” (Scaliger, 1557: 600). It was contained twice in the collection of proverbs proposed by Meurier (1557: n.p.). In Le Blanc (1556: 198; 1578: 147), *ciron* translated the *acarus* used by the Italian polymath Gerolamo Cardano in his *De subtilitate rerum* published in 1550 (Cardano, 1663: 515). Lastly, the term appeared in works as different as the history book by Crespin (1555: 113), the book on astronomy by Girault (1592: 6), the treatise on wines by Paulmier (1589: 52), the textbook on agronomy (Serres, 1600), the fictional work of the novelist Béroalde de Verville (1612: 184), the comprehensive works on music theory written by Mersenne (1636: 184), and La Fontaine's *Fables* (La Fontaine, 1668, 1678). *Romeo and Juliet*, the tragedy completed by William Shakespeare in around 1595, evoked the scabies mite: “Not half so big as a round little worm / Prick'd from the lazy finger of a maid”, an interpretation defended by Keil (1957).

The term remained current in the 17<sup>th</sup> century. It is used in the correspondance of Nicolas Fabri de Peiresc (letter of 22 May 1622, Jaeger, 1922: Ms. No. 1774, Fol. 407; letter of 2 Feb. 1634 to Gassendi reproduced in Tamizay de Larroque, 1893) and by Christiaan Huygens (letter to Lodewijk Huygens, 4 November 1667 reproduced in Huygens, 1895). It is also used by the French tumbler Tabarin (1622: 85; 1625: 86), the writers Sorel (1641: 834; 1663: 576), and Fortin de La Hoguette (1653: 76) who mentioned the skin, the dramatist Cyrano de Bergerac (1665: 100, 101) who referred to itching and blisters, and the protestant theologian Jurieu (1684: 161).

### The symbolism of the word *ciron*

In his seminal text, Pascal (1670) illustrated the infinitesimally small with the *ciron* which remains today a living symbol of smallness. An eloquent example is offered by Grousset's (1942) translation of the *Zhuangzi*, a Chinese canonical text: “*un ciron vaut une montagne*” (the term *wén*, opposed to the mountain, is usually translated by mosquito). In the 17<sup>th</sup> century, such a sense is common and the smallness of cirons was alluded to by numerous authors who were not physicians: Battista (1529: n.p.), Aldrovandi (1602: 544), Duret (1605: 69), Fuzy (1619: 35), Montluc (1630: 533), Monet (1635: 874), anonym (1651: 1), Aubignac (1655: 116), Du Roure (1665: 123)...

Another close sense is found in texts written by poets (Baudelaire, 1857) and philosophers (Alain, 1931; Sartre, 1942) who stressed the insignificance or the meanness of man. Diverse negative connotations are perceived in Apollinaire (1911 — “*Regardez cette troupe infecte / Aux mille pattes, aux cent yeux / Rotifères, cirons, insectes*”), Le Clezio (Nobel Prize in Literature-1965 — “*Lourde citerne d'eau stagnante où couraient les cirons et les moustiques*”) and many others.

*Ciron* may even become an insult: Rivarol used insulting language against Cubières aping Dorat : “*C'est un ciron en délire qui veut imiter la fourmi*” (statement reported by the Goncourt brothers, 1854 ; Gourmont, 1909).

The remark of the French chronicler Brantôme (*ca* 1537–1614) is outstanding: “Le cas d’une fille est fait de chair de ciron ; il démange toujours ; et celui des femmes est de terre de marais, on s’y enfonce jusqu’au ventre” (Brantôme, 1881). Around the same period, this erotic symbolism was copied by Tabarin (Duneton, 2014). Such a symbolism associated with the itch mite was already present in Rabelais and in Cotgrave’s dictionary (Screetch, 1995: 179). Lastly, the *ciron* evoked by Breton (1973: 116) is strangely reminiscent of the statement of King James I of England (1566–1625) who has the credit of having declared that “none but kings and princes should have the itch, for the sensation of scratching is so delightful”. A similar allusion is found in the old French song “*J’ai un ciron sur la motte*” (*ca* 1475–1480 — Tacaille, 2015). Although King James’ remark is associated to scabies (Wilson, 1865: 112; Lyell, 1976: 119; Currier *et al.* 2012: E50), a reference to *Pthirus pubis* may not be excluded: the itch-mite is frequently mentioned with lice in old textbooks but the difference was already stressed by Mouffet (1634: 266).

## **The medical approach**

Even if the history of scabies is fascinating and controversial (Ramos-e-Silva, 1998: 625), it is beyond the scope of this article. Just as an example to illustrate the importance of scabies, in Paris around 1850, 250 to 300 sick people went everyday to the *Hôpital Saint-Louis* where those suffering from ringworm and scabies were treated free of charge (Le Quellec, 2000). Seriously affected scruffy individuals were admitted to a special service providing 60 beds for men and 15 for women (Feulard, 1886).

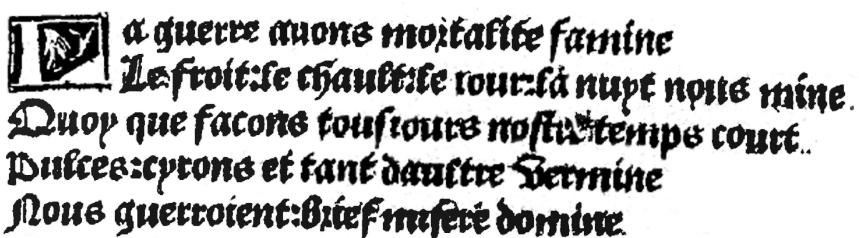
## **The school of Salerno**

Scabies, important for the 19<sup>th</sup> century hospital management, was obviously not ignored in the medical world of the Middle Ages. *Syrones* appeared in the *Trotula*, the most influential compendium in medieval Europe, presumably written by Trotula of Salerno (11<sup>th</sup> or 12<sup>th</sup> century), alleged to be the first female professor of medicine at the medical school of Salerno (Italy). The book comprises three texts written in Latin; these three popular texts survived in more than 100 manuscripts, were assembled and printed by Kraut in 1544 (*editio princeps*) and were again edited and translated by Green (2001). In *De ornatu mulierum*, there is the following passage: “*Ad syrones rodentes capillos...et inde capillos frica inter manu. Hoc syrones expellit et occidit*”. Green (2001: 175) translated this way: “For itch-mites eating away at the hair...and then rub the hair between the hands. This expels itch-mites and kills them” (Green, 2001: 175). This passage probably refers to a head lice infestation and not to a mite. It is, however, indicative of the difficulty interpreting old medical texts. As already commented by Oudemans (1929: 704), the section dealing with scabies is short (2 lines) and did not refer to an animal. However in the 1550 edition, named *Trotulae curandarum aegritudinum muliebrium ante, in, & postpartum Liber*, *syrones* are cited “*vermé de manibus & pidibus*” (Trotula, 1550: 36).

## **The school of Montpellier**

Quite different were the *syrones* described in the *Chirurgia*, also written in medical Latin, by Henri de Mondeville, royal surgeon to French kings Philippe the Fair and Louis the Stubborn: the text, composed between 1306 and 1320, clearly referred to minute animals boring between skin and flesh (Nicaise, 1893: 635).

Guy de Chauliac, who succeeded him in Montpellier (France, the world’s oldest medical school still in operation), also stipulated that *syrones* were small animals, living between “*carnem, & cutem*” especially on the hands and evoked the contagious nature of *syrones* in his *Chirurgia magna* composed around 1363 (Humphery-Smith *et al.*, 1990). The Mal Latin — and the terms *syrones* or *sirones* — remained in vogue for several centuries and these terms were still found in Plenck (1776). These animals became *cyr ons* or *cir ons* in subsequent



**Figure 1** Facsimile of Meschinot's *Lunettes des princes* (1493). Document from the *Bibliothèque nationale de France*. The word *cyrone* is used on the 4<sup>th</sup> line.

francophone editions, for example by Nicaise (1893) and Gombert and Chevalier (2006). Another consequence of Chauliac's *Chirurgia magna* was the introduction of *ciron* into Middle English (Kurath, 1959: 280-281). Although it is obsolete, the word is still found in the Oxford English Dictionary.

Guillaume Rondelet, also professor of medicine at the University of Montpellier and teacher of François Rabelais, evoked the *cyrones* living “semper intra cutim & cuticulam” (Rondelet, 1573: 10) and the women extracting them with a needle (Rondelet, 1573: 11).

### Other medical approaches

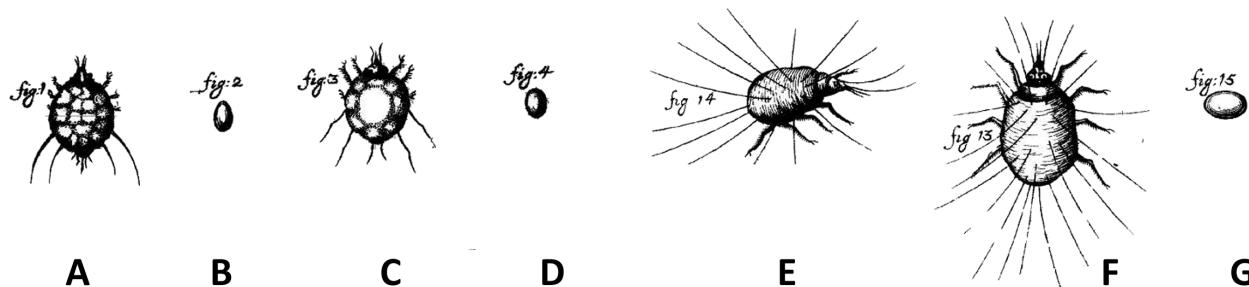
Prior to Pascal's time, in the 16<sup>th</sup> century, physicians citing *syrones* include Ambroise Paré (*ca* 1510–1590, France), Vigo (1534: n.p.; Italy), Lange (1560: 174; Germany), Vidius (1586: 89; France), Boorde (1547: n.p.; UK) and Heurnius (1594: 37; Germany).

The *syrones*, i.e. *Sarcoptes scabiei*, were also well known in Pascal's time and were mentioned by Platter, a medical student in Montpellier in the previous century; the Swiss physician wrote: “*Hos Sirones Germani Suren appellant, rectius fortè Chirones, cum manus occupent*” (Platter, 1608: 966). Pascal was 11 years old when they were studied by Mouffet (1634: 267-269) who cited Aristotle (and alluded to “*caeo & cerae*”), mentioned his predecessors (Avinzoar, Gabucinus), described their habits, and scripted “*Animalculū est omnium minutissimum*”. The renowned German physician Sennert (1634: 118) referred to *sirones* or *chirones*, also called *seuren* and moreover indicated that, for the most part, they are extracted with a needle (Sennert *et al.* 1661: 2486). Borellus (1656: 16-17 [*observatio XXI*], 21 [*observatio XXXII*]) used a microscope to refer to *vermiculi* associated to scabies and reported turtle-shaped *syrones* in humans, a shape also observed by the German physician Wichmann (1786: 39) and dermatologists Hebra and Kaposi (1870: 673) (but *syrones*, which are Acari on page 17 and in Borellus' index, were associated to *variolis* [*observatio XXXI*]). Similar confusions with regard to diseases were made by the Polish scholar and physician Jonstonus (1657: 93, 130). In contrast, the *syrones* “*in cute*” were appropriately named Wheal-worm, Hand-worm or *acarus* by the English physicians, Merrett (1667: 206) and Charletoni (1677: 52).

Lastly, after the first rough sketches drawn by Hauptmann in 1657 and by Ettmüller in 1682, an illustration was made by Bonomo (1687: end plate) who knew the difference between *A. siro* occurring in large number in old cheese (“*gran numero nel formaggio vecchio*” — Bonomo, 1687: 14; fig. 13-15 reproduced in Figure 2) and *S. scabiei* (his fig. 1-3 also reproduced in Figure 2).

### The origin of the word *ciron*

Two origins were considered by Ménage (1694: 199): either the word derives from the Ancient Greek *χείρ* (*kheír*, ‘hand’) (see also Table 2) or the animal is named after the *cire* (French name for wax) where it is born according to Aristotle. Michael (1903: 117, footnote) advanced that



**Figure 2** Facsimile of Bonomo's (1687) plate. (A-D) *Sarcoptes scabiei* — (E-G) *Acarus siro*.

the medical terms *sirones* and *syrones* could derive from the Greek Σίρός meaning cavity and be an allusion to the boring habit of *S. scabiei*.

Currently, the word *ciron* is said to derive from the Franconian etymon *seurō* and has a long history. From the second half of the 11<sup>th</sup> century, the term *seiron* appeared in the *Gloses françaises de Raschi* and designated the *cirons* (Darmesteter and Blondheim, 1929: 130). Around the same period, Hildegard of Bingen (1098–1179) wrote several manuscripts and books and used the medieval German form, *süren* latinized as *suriones*, to refer to “*gracillimi vermicili*”, the scabies mites (Jessen, 1862; Moniez, 1896; Fischer, 1927; Riethe, 2006; Romaní and Romaní, 2017). The animal was already found small by Simund de Freine (ca 1140–ca 1210) who wrote in *Le roman de philosophie* that “*un cirun tient petit liu / vers le grant munt de Mungi ;*” (Matzke, 1909: 34). At the same time, the term *ciron* appeared in the langue d’oc, more particularly in the ‘*sirventés*’ of Bertran de Born (ca 1140–ca 1215): “*Dedinz etz plus chaus d'un saiic / E a major cor us soiros*” (Thomas, 1888: 139). Coincy (1177(?)–1236) wrote: “*Je ne pris mie ij. suirons / Toute la gloire de ce monde.*” (Coincy, 1857: 694). Spelt in Old French, it is still noted by Littré (1863) who signaled the passage: “*Ki as surciz aura ciruns, / Si face ke nus li dirons*” (Ms. St Jean-13<sup>th</sup> century). In the three citations above, *soiros*, *suirons* and *ciruns* designate respectively the cirons.

Subsequently, the term is found in Middle French, in the chronicle of the troubadour Cuvelier dedicated to Bertrand du Guesclin and created around 1385: “*Et cilz François droit là, c'estoient bon Breton / Qui ne prisent Englois la queue d'un siron*” (Cuvelier, 1839: 192). It is also found in the *Lunettes des princes* written by Jean Meschinot and published after his death (“*Cyrons et tant d'autre vermine / Nous guerroient*”, Meschinot, 1493, *editio princeps* printed in blackletter typefaces or Gothic script, Figure 1).

Following the work of Gutenberg, printing made it possible to popularize manuscripts hitherto copied by hand. The *Rommant de la rose* written in 1230 by Guillaume de Lorris and completed around 1270-1275 by Jean de Meun was reprinted many times. The verses attributed to the latter, suggest we accept only those who have “*mains belles et nettes, ou de cirons ou de bubettes*”. The examples above attest to the use of the term *ciron* in Old and Middle French, even before Francis I imposed it as the administrative language by the ordinance of Villers-Cotterêts, in 1539.

Similar words (*chiron*, *sirones*...), i.e. derived from the same etymon, were also used in close areas, Germany, Belgium, UK and the Netherlands. For instance, in 1273, *sier* is for the first time recorded in Middle Dutch, as the plural *sieren*, in a text from West Flanders (Vaan, 2016). The plural *zieren* is also found in *Die pelgrimage vander menscheliker creature* (mid-15<sup>th</sup> century) and in *Het boeck vanden pelgherym* (1486). Pascal’s mite was part of a more global language movement involving other European countries.

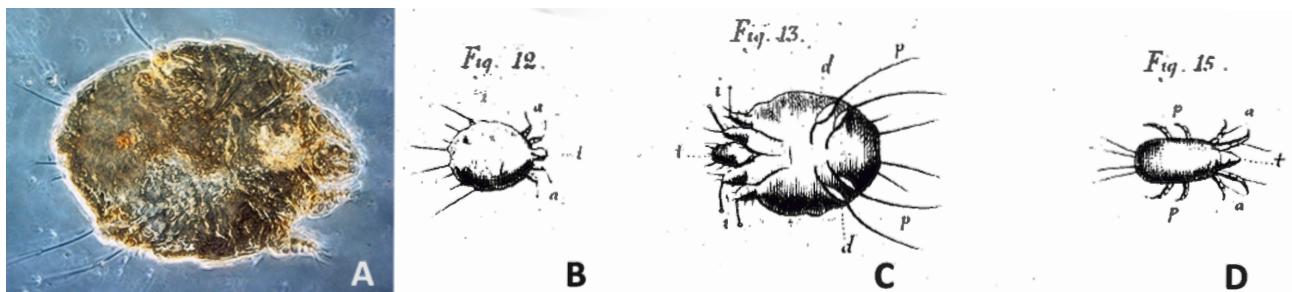
### The cheese mite, another naming in the 17<sup>th</sup> century

*Acarus siro* is not forgotten by 17<sup>th</sup> century French authors but is designated by another word, the *mite*. The term is not in Estienne (1539) but the 1549 edition clearly referred to the cheese mite. Therefore, the two French terms, *ciron* and *mite* should not be confused as they designate different species, respectively the scabies mite and the cheese mite. They may however coexist, even in the same sentence as exhibited by the letter of Peiresc of 21 May 1622 (Tamizey de Larroque, 1896).

In the 17<sup>th</sup> century, *A. siro* was usually designated by a single word: *mite* (French with the derived terms *miton*, *midon*), *mijt* (Dutch), *mite* (English, noted by Mouffet, 1634: 266), *midas* (Latin) (references in Table 3). In a letter written in 1622, Peiresc used the words *mittes*, *artissons* and *mitons* to describe mites collected from a piece of cheese (Brunet, 1951). The distinction is still made by Courtin (1824: 50-51). The ciron was rarely associated with cheese (e.g. Monet, 1635: 947; 1637: n.p.)

**Table 3** Definition of *mite* in the French dictionaries of the 16<sup>th</sup> and 17<sup>th</sup> centuries. The original spelling and formatting attributes are maintained in original quotations.

Source	Original definition	Paraphrase
Estienne (1549: 387)	Mites. Midas vermis est innascens fabis & caseis.	Mites. worms of <i>Midas</i> (Latin equivalent) nascent in beans and cheese
Thierry (1564: 309)	Midas vermis est innascens fabis & cafeis. Nos inde dicimus mites, & mitons, quasi midons.	worms of <i>Midas</i> (Latin equivalent) nascent in beans and cheese. We then say <i>mites</i> (French) or midons.
Thesaurus Theutonicae Linguae (1573: n.p.)	<b>Meluwen/ost mijten.</b> Petits vers comme cirons qui rôgent & se procreent en vn fromage sec, mites. <i>Acarus, midu, vermiculi innascentes caseis sine fabis etc.</i>	<b>Vermilion mites.</b> Small worms as cirons that gnaw and born in dry cheese, mites. <i>Acarus, mite, small worms in cheese and beans.</i>
Nicot (1584: 459)	Mite, Midas vermis est innascens fabis & caseis. Nos inde dicimus, <i>Mites &amp; Mitons</i> , quasi <i>Midons</i> .	Mites, <i>Midas</i> worms born in beans & cheese. We then say, <i>Mites &amp; Mitons</i> , like <i>Midons</i> .
Mellema (1587: n.p.)	<i>Mijte</i> , Mite ou maille, f.	<i>Dutch equivalent</i> , Mite or [?]
Stoer (1593: 584)	Mites, Midas vermis est inascens fabis & caseis. Nos inde dicimus, <i>Mites &amp; Mitons</i> , quasi <i>Midons</i> .	Mites, <i>Midas</i> worms born in beans & cheese. We then say, <i>Mites &amp; Mitons</i> , like <i>Midons</i> .
La Porte (1602: 268)	Mites ou Mitons. ... C'est un petit ver qui s'engendre ès febues & fromage	Mites or Mitons. ... It is a small worm born in beans & cheese
Nicot (1606: 413)	Mites, F. plur. Penac. Midas, vermis est innascens fabis & caseis.	Mites, plur. F. Penac. Latin name, worm born in beans & cheese.
Oudin (1607: n.p.)	<i>Mites</i> , gusano que roe las hauas y el queso.	Mites, worm that gnaws beans and cheese.
Cotgrave (1611: n.p.)	Mite: f. A mite, the smallest of coynes ; also, the little worme, called a Mite.	Mite: f. A mite, the smallest of coins; also, the little worm, called a Mite.
Poille (1614: n.p.)	<i>Mites</i> , vermi est innascens fabis & caseis.	<i>Mites, Midas</i> , worm born in beans & cheese.
Oudin (1627: 265)	Mites, vermi, que crescemo nelle fava , gusano que roe las hauas y el queso.	Mites, worms that grow up in beans , worm that gnaws beans and cheese.
Arsy (1643: n.p.)	Un Ciron, <i>Een sierken</i>	A Ciron, <i>Dutch equivalent</i>
Miege (1677: n.p.)	HITE, ou Miton, ver naissant dans les fruits & le fromage, the little worm called a Mite.	HITE, or Miton, worms born in fruits and cheese, the little worm called a Mite.
Richelet (1680: 2, 42)	HITE, calendre, ver qui ronge le blé. Item mite, miton, ver naissant dans les fruits & le fromage.	HITE, calendre, worm that gnaws the corn. Item mite, miton, worm born in fruits and cheese.
Furetière (1680: n.p.)	Mite, f. f. Sorte de fort petit insecte qui ronge les habits & mange toute la fleur de la farine.	Mite, f. f. kind of very small insect which eats up the clothes & feed upon floor.
Dictionnaire de l'Académie 2, 1 <sup>re</sup> éd. (1694: 74)	HITE. Subst. Fem. C'est le plus petit des Insectes, qui naist dans les feves & dans le fromage. Quand on voit une mite dans un microscope, on luy apperçoit huit grands pieds pareils à ceux des faucheurs.	HITE. Fem. Noun. It is the smalles insect that takes birth in beans & cheese. When one sees a <i>mite</i> under a microscope, he has eight large feet like those of harvestmen.
	<b>HITE.</b> f. f. Petit insecte qui est presque imperceptible, & qui s'engendre ordinairement dans le fromage. <i>Ce fromage est plein de mites.</i>	<b>HITE</b> f. f. Small insect which is almost imperceptible, & usually born in cheese. <i>This cheese is full of mites.</i>



**Figure 3** (A-C) – *Sarcopetes scabiei* – (D) *Acarus siro* – (A) Photography in light microscopy modified from André and N'Dri (2013). (B-D) Facsimile of Geer's (1778) plate 5.

It is noteworthy to remark that the cheese mite is clearly visible to the naked eye while the adult female *S. scabiei* is only 300-504 µm long (Arlian, 1989), the size of the cheese mite is thus hardly compatible with the infinitesimally small invoked by Pascal. This significant difference in size between the “smallest of Creatures” and the mite observed in cheese was already perceived by Power (1663: 16-17, 22).

Another difference concerns the shape: “the body of the acarus farinae appears to be more oblong than that of the itch insect” (anonym, 1788: 43; see also Geer, 1778: 97), an oblong shape that contrasts with the special turtle shape of *S. scabiei* as already noted, in Pascal's time, by Borellus (1656: 17).

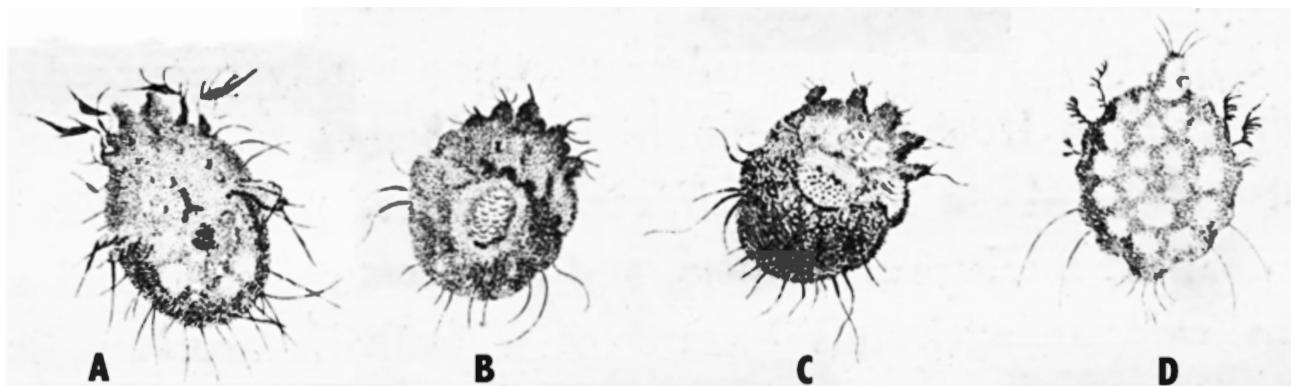
Nowadays, up to 10 species are identified in cheese, but only 2 are currently inoculated and could be called cheese mite, *A. siro* and *Tyrolichus casei* (Melnyk *et al.* 2010).

### Classification of mites in the 17<sup>th</sup> and 18<sup>th</sup> centuries

If ticks are excluded, mites known in the first half of the 17<sup>th</sup> century formed a group limited to 2 species: namely the cheese mite, *A. siro*, and the scabies mite, *Sarcopetes scabiei*. Geer (1778: 83) called them ‘Mittes’ (with two ‘t’, idiosyncratic spelling) and recognized that the species are very different. However, his plate 5 did not illustrate the dorsal scales seen by Power (1663: 22), Rohault (1671: 145) and Ozanam (1694: 162) and typical of the species (Figure 3). Was his microscope so bad? His drawings seem to be so mediocre when they are compared to Goeze's illustrations published by Wichmann (1786) and reproduced in Figure 4.

Many mites were observed during the second half of the 17<sup>th</sup> century (pre-Linnaean works). For instance, Power (1663) reported mites in dust, in figs, in Jujubes, a red variety on spiders, on humble-bees (genus *Bombus*, part of Apidae), and in ponds. In 1758, the 10<sup>th</sup> edition of the *Systema naturae* was published by Linnaeus who described 31 species of mites, all in a single genus, *Acarus*. Under the heading *Acarus siro*, three species were put together: *siro*, *farinae* and *scabiei*. Provided Geer's *domesticus* corresponds to Linnaeus' *siro*, the confusion was cleared up by Geer (1778) but all the mites, discussed under the heading ‘mittes’, remained in the genus *Acarus* erected by Linnaeus. The classification was repeated in 1783 but the genus *Sarcopetes* was established later by Latreille (1802).

In 1775, Fabricius proposed the genus *Trombidium* for three species (*tinctorium*, *holosericeus* and *aquaticus*), the last two being listed and assigned to *Acarus* by Linnaeus (1758). The following year, Müller erected the genus *Hydrachna*. The dismemberment of Linnaeus' genus *Acarus* had already started as early as the 18<sup>th</sup> century and is reflected in Vicq d'Azry's (1792) classification. Still later in the 18<sup>th</sup> century, Latreille (1795) proposed a division into 11 units (e.g. *Bdella*) and, in 1796, he advanced a final classification (mites were called *Acéphales*) into 18 genera. *A. siro* was part of genus 17. Pascal's mite was not mentioned. His *ciron* referred to the genus *Siro*, his genus 18, currently assigned to Opiliones and not to mites. Obviously, Latreille's *ciron* is not Pascal's *ciron*.



**Figure 4** Facsimile of Goeze's figures published by Wichmann (1786). (A) *Acarus siro* — (B-D) *Sarcoptes scabiei*.

## Conclusions

*Sarcoptes scabiei* lies at the crossroads of two traditions: a popular perspective on the one hand, a medical approach on the other hand. The latter referred to Latin word *syrones* and traced its history back to Trotula of Salerno (12<sup>th</sup> century). The former derived directly from the Franconian etymon *seurō* already used in the 12<sup>th</sup> century by Hildegard of Bingen; Pascal's mite was part of this long popular tradition. Yet both trends were based on the same etymon.

Pascal's mite is an ancient story involving two species, the cheese vs the scabies mite. The identity of Pascal's mite is simply elucidated by consulting the epoch's dictionaries and encyclopedias, i.e. primary sources. Books and other publications published at that time or issued earlier were also scrutinized. In the days of Pascal, *S. scabiei* was a well-known mite and was designated by the vernacular term *ciron*. In addition to linguistic arguments, the morphology (scales or spines), the habitat (skin) and the size argue in favor of the scabies mite.

Pascal's *ciron* is thus the human scabies as written by Morali (2004). The mix-up between the two species, the cheese and the scabies mite, was made by Goeddart (1662: 125), continued in Linnaeus' successive publications (cf. Oudemans, 1913), in Fabricius (1775: 812) and triggered the gallic affair in Paris, usually presented as a scientific fraud perpetrated by a student named Galès in his medical thesis in 1812 (Janier, 1994; Ghesquier, 1999; Ghesquier-Pourcin, 2011). The confusion was also maintained in the 8<sup>th</sup> edition of the *Dictionnaire de l'Académie française* (1932) that explicitly referred to cheese and flour (but not in previous editions) and reproduced in Littré's dictionary (1863: 628). It is also found in Rey (1998: 762) and Bonnafé *et al.* (2014). The famous *Encyclopédie* edited by Diderot and d'Alembert probably marked a turning point with two entries for *ciron*: the first entry (natural science) was written by Daubenton (1753: 475-476) and related to the two species while the second one (medicine) was composed by Venel (1753: 476) and dealt only with the scabies mite.

This example illustrates the way that when we look back into the past with modern techniques and equipment (Ratcliff, 2009) and current ideas (Ghesquier-Pourcin, 2011). There is a growing risk of bias in the future, especially when the principle of priority is to be respected.

## Acknowledgements

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