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The true identity of Pascal’s mite and the diachronic use of ciron

Henri M. André

Corresponding author
Henri M. André: hmandre@bluewin.ch

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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 17th and 18th centuries is reviewed.

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

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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 (Armitor, 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 incomparablement plus petites, des jambes avec des jointures, des veines dans ces jambes, du sang dans ces veines, des humeurs dans ce sang, des goutes dans ces humeurs, des vapeurs dans ces goutes…” (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), 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 16th and 17th 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*, *cyron*, *süren*, *syrones*… 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 16th and 17th 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 *syrones* 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 17th and 18th centuries.

**A popular approach**

**French glossaries and dictionaries of the 16th and 17th 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 17th century took the term *ciron*, from the Nicot’s *Thresor de la langue française*, a document that played an important role in the development of French lexicography, to the 1st 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).
| Source | Original definition | Paraphrase |
|--------|---------------------|------------|
| Mellema (1602: n.p.) | Vn Ciron, Een sierken | À ciron, Dutch equivalent |
| La Porte (1602: 86) | Ciron. Grateleux, demangeant, petit, gâlé, traceux, menuet ou menu, vermelet, galonné, fort porté en amignotant. | Ciron. Scabiousus, itching, small, scabious [?], tracing, minute or tiny, vermiform, gallooned, [?]. |
| Nicot (1606: 125) | Ciron. 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 adusté en divers endroits de la personne, mais plus communément ès mains, qui ronge et fait demanger où il est concreé. | Ciron, 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.) | Un ciron, arador de la mano. | Un ciron, Spanish equivalent. |
| Cotgrave (1611: n.p.) | Ciron: m. A Hand-worme. | Ciron: m. A handworm. |
| 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 animaux, qui s'angeandre an la Cire, an la chair humaine, & autre part : hoc Acari, eos, ios. hic Acarus,ri. Aristoteles 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, pilucello, pellcello, bacolino, setola. Cironiere, quantità di baccolini nelle mani. | Ciron, followed by Italian terms. |
| Pouvreau (1663: n.p.) | Cigarr. Ciron | Cironiere, many cirons on the hands. |
| Anon. (1677: 150) | Ciron, m. Sedicello, che nasce nella mana, pedicello | Basque equivalent. Ciron |
| Miege (1677: n.p.) | A hand-worm, un ciron. | Basque equivalent. Full of cirons. |
| 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 & gratelle. Le microscope nous fait découvrir plusieurs parties en un ciron. Mr. Gassendi en observant un ciron, l'a vu émeutir. | 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. |
| Dictionnaire de l'Académie 1, 1re éd. (1694: 192) | 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. |
| | 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 espingle. | 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 16th 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 3rd edition of Robert Estienne’s *Dictionarium latinogallicum* (1552: 6), in Dupuys’ dictionary (1573: 134) as well as in Nicot’s dictionary (1574: 134) and Stoer’s dictionary (1593: 172). Similarly, the two terms, *syrones* 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 francoyse* (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 16th century. The original spelling and formatting attributes are maintained in quotations.

| Source          | Original definition | Paraphrase                                                                 |
|-----------------|---------------------|-----------------------------------------------------------------------------|
| Palsgrave (1530: 290) | Wormē in the hand — *ciron*  s, m. | Worm in the hand — *ciron*  m, n.                                          |
| Estienne (1539: 90) | *Ciron*. | *Ciron*.                                                                     |
| Estienne (1552: 6) | *Acarus, acari, m. g. Vn ciron*. | *Acarus, acari, m. g. A *ciron*.                                           |
| Thierry (1564: 115) | *Vn Ciron, Acarus. [Vermiculos seu teredines quibus manus nostrae potissimum infestantur. Chirones vocamus *Chiron* αν' τῶν γαρπῶν, hoc est à manibus.] | A *Ciron, Acarus. Small worm or boring-worm which can infestate on our hands. We call them Chirones. Chirones Greek text meaning on the hands, from the Greek word meaning hands. |
| Dupuys (1573: 134) | *Vn Ciron, Acarus. Vermicilos seu teredines quibus manus nostrae potissimum infestantur, Chirones vocamus *Chiron* αν' τῶν γαρπῶν, hoc est à manibus.* | A *Ciron, Acarus. Small worm or boring-worm which can infestate on our hands. We call them Chirones. |
| Nicot (1573: 132) | *Chiron, voyez Ciron* | *Chiron, see Ciron.*                                                        |
| Nicot (1573: 134) | *un Ciron, Acarus. Vermicilos seu teredines quibus manus nostrae potissimum infestantur, Chirones vocamus, *chiron* αν' τῶν γαρπῶν, hoc est à manibus.* | A *Ciron, Acarus. Tiny worms or grubs that can infestate our hands, we call them Chirones, [see above]. |
| Meurier (1574: n.p.) | *Vn ciron, m. een sierken* | *A ciron, m. Dutch equivalent.*                                              |
| Calepino (1586: 18) | *Ačárus, ri. {ακαροσ. Gall. Petit vers qui naist dedans la cire, ou ciron. Ital. Il tarletto, que nasce nella cera, ès il pedicello ò volgarmente pidocchietto. Germ. Ein mib dê im macho ancher. Hisp. El arador. Angl. A mitte.} | *A ciron, Acarus. 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. A mitte that takes birth in wax. Hisp. Mite in Spanish. Angl. A mitte.* |
| Stoer (1593: 172) | *Un Ciron, Acarus. Vermiculos seu teredines quibus manus nostrae potissimum infestantur. Chirones vocamus. *Chiron*, hoc est à manibus.* | *A ciron, Acarus. Small worm or grubs that can infestate our hands. We call them Chirones. Chirones , [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.; Mellema, 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), *Sären, Seur* or *Seuren* in German (e.g. Platter, 1608: 966; Friusius, 1616: 8; Mouffet, 1634: 266), *bacolino, sciro, sérola, pellicello, pidocclietto* 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 (Sevent, 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 ἄκαρι 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 17th 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; Blanchardi, 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 *cironniere*, 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 16th century, consisted of comparing the ciron to the elephant or to another big animal: Bodín (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 douillette 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 Montaiglon, 1858: 35) and in Le droit 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 synonyms 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 (1630: 533), 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 17th 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: 333), 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 enfose 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 (Screech, 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 19th 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 (11th or 12th 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 rodents 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 cyrons or cirons in subsequent
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 16th century, physicians citing *syrones* include Ambroise Paré (*ca* 1510–1590, France), Vigo (1534: n.p.; Italy), Lange (1560: 174; Germany), Vidianus (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 Súren appellant, rectiùs fortè Chirones, cóm 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 “cafeo & cerae”), mentioned his predecessors (Avinzoar, Gabucinus), described their habits, and scripted “*Animalculū est omnium minutissi-mum*”. 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 *vernicali* 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 XXXII*]). 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
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 *cirón* is said to derive from the Franconian etymon seurō and has a long history. From the second half of the 11th 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 vermicilli”, the scabies mites (Jessen, 1862; Moniez, 1896; Fischer, 1927; Riethe, 2006; Romani and Romani, 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 *cirón* 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 saici / E a major cor us soiros” (Thomas, 1888: 139). Coiney (1177(?)-1236) wrote: “Je ne pris mie ij. suiron / Toute la gloire de ce monde.” (Coiney, 1857: 694). Spelt in Old French, it is still noted by Litré (1863) who signaled the passage: “Ki as surcilz aura ciruns, / Si face ke nus li dirons” (Ms. St Jean-13th century). In the three citations above, *soiros*, *suiron* and *cirons* designate respectively the cirons.

Subsequently, the term is found in Middle French, in the chronicle of the troubadour Cuvelier dedicated to Bertrand de Guesclin and created around 1385: “Et ciz François droit là, c’estoient bon Breton / Qui ne prisen 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 dauatre 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 *cirón* 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 *zieren*, in a text from West Flanders (Vaan, 2016). The plural *zieren* is also found in *Die pelgrimage vander menscheliker creature* (mid-15th 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 17th century

Acarus siro is not forgotten by 17th 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 (Tamizyzy de Larroque, 1896).

In the 17th century, A. siro was usually designated by a single word: mite (French with the derived terms miton, midon, mittes (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, artisons 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 16th and 17th 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 Midas (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 Midas (Latin equivalent) nascent in beans and cheese. We then say mites (French) or midons. |
| Thesaurus Theutonicae Linguae (1573: n.p.) | Meluwen/ost mijten. Petits vers comme ciron qui rōgent & se procreent en vn fromage sec, mites. Acarus, midu, vermiculii inasentes caseis sine fabis etc. | Vermin mites. Small worms as ciron that gnaw and born in dry cheese, mites. Acarus, mite, small worms in cheese and beans. |
| Nicot (1584: 459)       | Mite, Midas vermis est innasens fabis & caseis. Nos inde dicimus, Mites & Mitons, quasi Midons. | Mites, Midas worms born in beans & cheese. We then say, Mites & Mitons, like Midons. |
| Mellema (1587: n.p.)    | Mijte, Mite ou maillé, f.                                                            | Dutch equivalent, Mite or (?)                                             |
| Stoer (1593: 584)       | Mites, Midas vermis est insasens fabis & caseis. Nos inde dicimus, Mites & Mitons, quasi Midons. | Mites, Midas worms born in beans & cheese. We then say, Mites & Mitons, like Midons. |
| 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 innasens fabis & caseis.                     | Mites, plur. F. Penac. Latin name, worm born in beans & cheese             |
| Oudin (1607: n.p.)      | Mites , gusano que roe las hausas 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 worne, called a Mite.      | Mite: f. A mite, the smallest of coins; also, the little worm, called a Mite. |
| Poille (1614: n.p.)     | Mites , vermi est innasens fabis & caseis.                                           | Mites, Midas, worm born in beans & cheese.                                |
| Oudin (1627: 265)       | Mites, vermi, que crescono nelle fava, gusano que roe las hausas y el queso.          | Mites, worms that grow up in beans, worm that gnaws beans and cheese.      |
| Arsy (1643: n.p.)       | Un Ciron, Een sierken                                                               | A Ciron, Dutch equivalent                                                |
| Miege (1677: n.p.)      | MITE, ou Miton, ver naissant dans les fruits & le fromage, the little worm called a Mite. | MITE, or Miton, worms born in fruits and cheese, the little worm called a Mite. |
| Richelet (1680: 2, 42)  | 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. |
| Furetière (1680: n.p.)  | MITIE. 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. | MITIE. Fem. Noun. It is the smallest insect that takes birth in beans & cheese. When one sees a mite under a microscope, he has eight large feet like those of harvestmen. |
| Dictionnaire de l'Académie 2, 1ère éd. (1694: 74) | MITE. f. f. Petit insecte qui est presque imperceptible, qui s'engendre ordinairement dans le fromage. Ce fromage est plein de mites. | MITE. f. f. Small insect which is almost imperceptible, & usually born in cheese. This cheese is full of mites. |
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 *Tyrophilus casei* (Melnyk et al. 2010).

**Classification of mites in the 17th and 18th centuries**

If ticks are excluded, mites known in the first half of the 17th century formed a group limited to 2 species: namely the cheese mite, *A. siro*, and the scabies mite, *Sarcoptes 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 17th 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 10th 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 ‘mites’, remained in the genus *Acarus* erected by Linnaeus. The classification was repeated in 1783 but the genus *Sarcoptes* was established later by Latreille (1802).

In 1775, Fabricius proposed the genus *Trombidium* for three species (*tinctorum*, *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 18th century and is reflected in Vicq d’Azyr’s (1792) classification. Still later in the 18th 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*.
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 (12th century). The former derived directly from the Franconian etymon seurō already used in the 12th 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 8th 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.

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