



DEMONSTRATION OF SOME DOMESTIC MITE SPECIES INCRIMINATED IN DERMATOLOGICAL DISEASES IN BRAZZAVILLE (CONGO)

Lenga Loumingou Ida Aurelie¹, Lenga Arsène^{2*} and Mabondzo Simon²

¹Laboratory of biodiversity and animal ecology, Faculty of Science and Technology, MarienNguouabi University

²Dermatology and Venereology Service, Brazzaville Hospital and University Center, Faculty of Health Sciences

ARTICLE INFO

Article History:

Received 4th January, 2019

Received in revised form 25th February, 2019

Accepted 23rd March, 2019

Published online 28th April, 2019

Key words:

mites, houses, dermatoses, Brazzaville

ABSTRACT

Allergic dermatoses represent the most observed dermatological complaints in most health facilities in the Congo, particularly in the Brazzaville hospital and university center. Dermatological and entomological surveys were conducted in 4 districts covering 40 dwellings for 212 people visited. The study was conducted over a year integrating the rainy season and the dry season. Dix dwellings were chosen in each of the five neighborhoods of each district. The collection of the specimens in the houses was consecutive to the brushings of the sofas, the carpets, the soft toys, the carpets but also after display of a cloth under the beds. Other specimens came from house dust. In the dwellings selected, the temperature and humidity were systematically recorded. The results show that three (3) types of allergic dermatoses are observed: popular urticaria, eczema and scabies. It appeared that popular urticaria represents the highest prevalence with 86% of cases mainly in children whose age is between 3 and 9 years. On the other hand, 727 specimens of arthropods incriminated in the occurrence of dermatoses in the houses are mites belonging to the species *Dermatophagoides pteronyssinus*, *D. farinae* two of the family of pyroglyphidae and *Ixodes ricinus* of the family Ixodidae. Abundance of harvested arthropods was observed at 26.26 ° C and 70.14% RH on average.

Copyright©2019 **Lenga Loumingou Ida Aurelie et al.** This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Vector-borne diseases account for more than 17% of all diseases worldwide. Their distribution is determined by a complex dynamic mixing environmental and social factors (OMS, 2016). In recent years, the effects of the globalization of travel and trade, unplanned urbanization, and ecological challenges such as climate change have had a significant impact on the transmission of these diseases. Allergic skin diseases are a major public health problem in all emerging countries (Xu *et al.*, 2012; Barbarot, 2016). Cutaneous affections are common in children and occupy a prominent place in hospital practice in Africa.

At the University Hospital Center of Brazzaville in Congo, Popular urticaria and atopic dermatitis are the main dermatoses (Lenga-Loumingou, 2015). The various studies carried out report a high frequency of popular urticaria and this pathology occupies the first rank of skin diseases in children (Lenga *et al.*, 2013; Lenga-Loumingou, 2015).

The mites and the insects are regularly incriminated in multiple dermatoses, this is the case of the Popular urticaria, the

atopic dermatitis and scabies. Of all the animal allergens, the mites are known to be a major risk factor of development of dermatological diseases for papular or eczema (Halcken, 2004).

The most common species of mites are those observed in house dust. They belong to the Pyroglyphidae family, which includes 48 species. Insects, for their part, occupy a very important place in vector-borne diseases; this is the case with Diptera such as Anopheles or Aedes (Bitsindou *et al.*, 2012), tsetse flies (Andjingbopou *et al.*, 2018), Anoploures (Pajot, 2000) and Hemiptera such as *Cimex lectularius* (Delauney *et al.*, 2012).

In most cases, hematophagy in these arthropods is essential. It is indeed, always on the occasion of a blood meal on an infected vertebrate that these insects are responsible for cutaneous pathologies (Canteaume et Imbert, 2014; Peres *et al.*, 2018).

Papular urticaria is an allergic dermatosis due to cellular hypersensitivity (Demain, 2003). Atopic dermatitis (AD) is a chronic inflammatory pruritic dermatosis of multifactorial origin (Barbarot, 2016). Its frequency is important and increases steadily, especially in industrialized countries (Barbarot, 2016).

***Corresponding author: Lenga Loumingou Ida Aurélie**

Dermatology and Venereology Service, Brazzaville Hospital and University Center, Faculty of Health Sciences

In this work, we have undertaken to identify the different types of arthropods that are dependent on domestic environments, which can cause dermatological pathologies in the infant population.

We have particularly determined the characteristics of the areas most likely to harbor the arthropods responsible for the appearance of popular urticaria, atopic dermatitis, in dwellings; In addition, the categories of children affected or infested were determined as well as arthropods living in common dwellings.

Presentation of the Place of Study

Brazzaville is the political and administrative capital of the Republic of Congo. It covers an area of nearly 263,9 km². Its current population reaches two million inhabitants and it is located at 4 ° South, 15 ° East of longitude and 284 m of altitude on average.

The city of Brazzaville has 9 districts (arr.) distributed as follows: Makélékélé (arr.1), Bacongo (arr.2) and Madibou (arr.8) located in south of the city, Poto-poto (arr. 3) and Moungali (arr.4) in the center, Ouenzé (arr.5), Talangai (arr.6) and Djiri (9) in the north and finally M'filou (7) in the southwest. The city is crossed by numerous rivers of unequal importance of which Madoukoutsékélé in the center, the tsiémé and Djiri river in the north of the city, the M'filou and the Djoué rivers in the south. All these streams flow into the Congo River.

MATERIAL AND METHOD

Field Equipment

A pocket-type bifocal magnifying glass of 5.5-diopter metal-rimmed acrylic lens has been used for spot observation of arthropods in the field. Jars of 75 and 125 ml were used for storing and preserving arthropods in 70 ° alcohol. For the collection of arthropods attached to the rooms, white sheets had been placed under the beds in the houses; a thermo-hygrometer allowed to evaluate the climatic variations on the ground. A camera of the Nikon D3000 type made it possible to take pictures of arthropods.

Laboratory Equipment

A binocular magnifying glass of the Leica zoom 2000 type was used to observe the morphological characteristics of harvested arthropods leading to their determination (Krantz and Walter, 2009). An optical microscope of the type visioptic LIIoo A allowed the fine observation of the morphological particularities of the arthropods. Finally, fine forceps and soft forceps allowed the manipulation of arthropods.

The present study was carried out in the 2nd, 4th, 6th and 7th districts.

METHODOLOGY

A prospective, descriptive and experimental study of all cases of allergic dermatitis encountered and arthropods found in homes was conducted during this work. Our study ran from November 17 of 2015 to October 12 of 2016, including the rainy season and the dry season. The choice of neighborhoods was made at random in the four (4) targeted boroughs: The first phase focused on the harvest of arthropods from house dust. The second phase concerned the selected population, consisting of children whose age was between 0 and 15 years.

In a first approach, a questionnaire followed by a survey and then the collection of samples was carried out. In each borough, 10 dwellings were chosen randomly at the rate of 2 dwellings per neighborhood, ie 5 neighborhoods per district.

In a second approach, the collection of the specimens in the dwellings was carried out by brushing sofas, carpets, soft toys, carpets but also by display of a cloth kept for 3 days under the beds.

All specimens collected from house dust were placed in jars containing 70% alcohol for preservation. Before observation under a microscope or a binocular magnifier, the preserved mite species were placed in 65% lactic acid to improve their visualization, thus facilitating their description. The dermatoses observed were previously diagnosed by a University Hospital Dermatologist.

The diagnosis of dermatoses was clinical. Only dermatoses were considered, the link to mites being allowed. It was atopic eczema certified by the United Kingdom Working Party score, popular urticaria and scabies. The thermal and hygrometric variations were carefully determined at each visit to dwellings selected using an Oregon Scientific RMR500 thermo-hygrometer.

Data processing

The Windows and Excel 2007 software allowed the calculation of the prevalence, frequencies and averages.

RESULTS

Epidemiological Aspects

We consulted 212 inhabitants in the four (4) districts of Brazzaville; there were 90 men and 122 women. Among them, 145 children were counted of which 42 presented the dermatoses studied, a prevalence of 28.96%.

Of the 42 children, 16 were female and 26 were male, giving a sex ratio of 1.62. The average age of children with dermatoses was 5.44 years.

The 42 children with dermatitis were composed of 36 cases of popular urticaria (86%), 5 cases of atopic dermatitis (12%) and one case of scabies, a frequency of 2%.

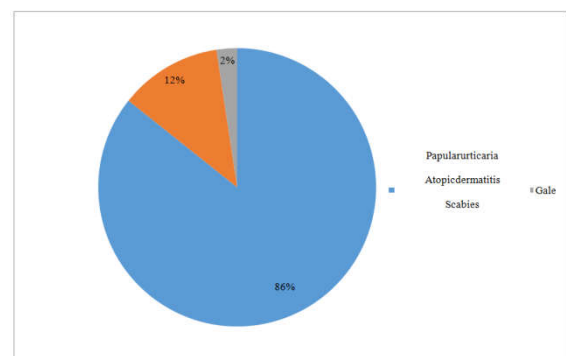


Figure 1 distribution of dermatoses in the 4 districts of Brazzaville.

Distribution of dermatoses by sex and age in the different districts of the study

The prevalence of allergic diseases was higher in M'Filou. The other three districts showed equivalent rates of dermatosis. In all districts, boys were more affected than girls (Table I). The average age of affected children was 5.44 years for all

boroughs and extremes ranged from 4.33 to 6.5 years.

Table I Distribution of dermatoses by sex and age in the 4 districts of the study

	District (Arr.) 2 Bacongo		District (Arr.) 4 Moungali		District (Arr.) 6 Talangai		District (Arr.) 7 Mfilou	
	B	G	B	G	B	G	B	G
Total number of children	16	22	14	21	13	18	17	24
Number of children with dermatoses	6	4	6	3	5	3	9	6
Average age of sick children (year)	5,33	5,75	5,5	5	6,4	4,33	4,44	6,5
% of dermatoses by sex	37,50	18,18	42,85	14,28	38,48	16,66	52,84	25
% of overall dermatoses	26,31		25,71		25,80		36,58	

B : Boys G : Girls

Clinical aspects

The different forms of dermatosis observed in two districts chosen in Brazzaville. The frequency of papularurticaria was 46.34% in the two selected districts. More specifically, in Ward 6 Talangai, only popular urticaria was observed (Table I and Photo 3). In arrondissement 7 Mfilou, papularurticaria, scabies and atopic dermatitis (photo 1 and 2) were diagnosed. A rate of 86% of patients with popular urticaria were pushed (inflammatory papules, pustules, excoriations). A rate of 14% of patients had pigment macules and lichenification. The eczema was oozing in 3 cases, lichenified in 2 cases, papular in 1 case, and nummular in 1 case. The clinical form of scab was that of a classic human scab.



Photo 1: Eczema on the arm in a child **Photo 2:** Eczema on the dorsal side of the hand in a child atopic of 8 years atopic of 9 years



Photo 3 Papularurticaria impetigo on the leg a child of 5 years

Entomological Aspects

Influence of temperature and relative humidity on arthropod abundance in Mfilou district.

In one of the districts studied, that of Mfilou, the temperature and the relative humidity were followed in 10 dwellings chosen at random between July and August 2016, thus during the dry season. The results show that the average temperature varied around 26.04 ° C, (Figure 1) while the relative humidity oscillated around an average of 70.67% for a total of 217 arthropods harvested.

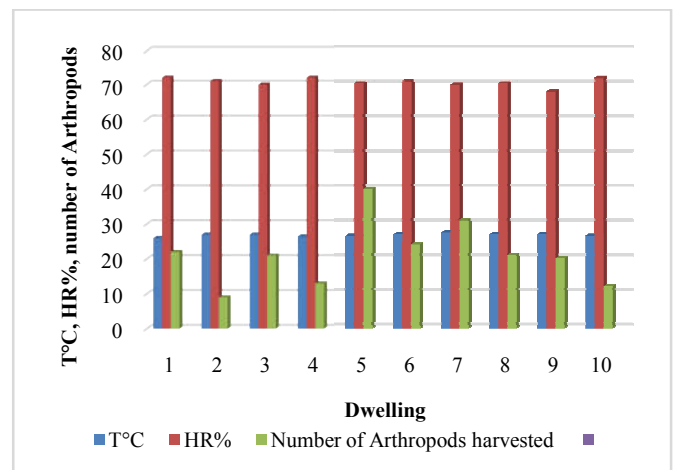


Figure 2 Influence of temperature and relative humidity on arthropod abundance in Mfilou District 7.

The results obtained show a stable temperature and relative humidity in all ten (10) houses studied. However, the numbers of arthropods obtained showed relatively large variations, ranging from ten (10) individuals for the second house investigated to forty (40) for the fifth home (Figure 1).

Distribution of the different mite species harvested in the 4 districts of Brazzaville

In the four districts investigated, the species *D. pteronyssinus*, from the family of pyroglyphidae mites, proved to be very abundant irrespective of the rounding, followed by the species *D. farinae*, of the same family but less abundant and lastly, the species *I. ricinus*, an ixodidae mite that can be presented as rare, if not absent, particularly in borough 4 as shown in 2 figure.

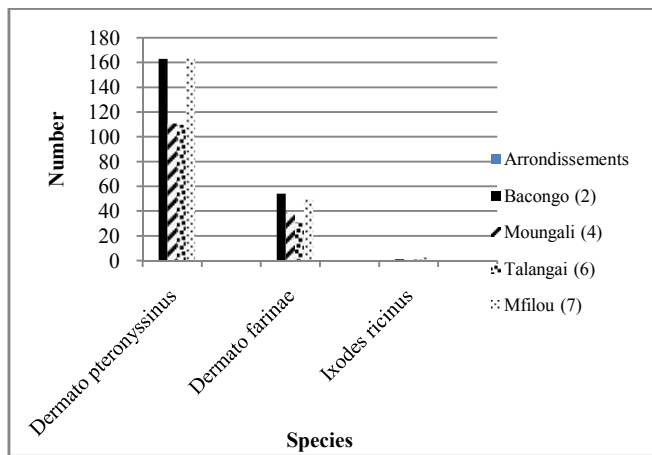


Figure 3 Distribution of species according to 4 districts of Brazzaville.

DISCUSSION

First the limit of the study: The collection of specimens in dwellings has proved delicate. Indeed, the lack of socio-sanitary education, beliefs, made it difficult access to homes, including bedrooms. In our study, popular urticaria is the first most frequent dermatosis in all 4 districts of Brazzaville with a prevalence of 86% followed by eczema, with a prevalence of 12% and finally scabies which represents a negligible prevalence of 2%.

These results are consistent with those obtained in Cotonou, Benin, which show a high prevalence of popular urticaria and eczema (Emodi *et al.*, 2010; Ade *et al.*, 2014;) However, in a French study on common dermatoses in black-skinned patients in the Paris region, (Arsouze *et al.*, 2008) reported no cases of popular urticaria in their series.

The importance of popular urticaria observed in the 4 districts of Brazzaville, could be related to the environmental conditions favoring the development of biting arthropods (mosquitoes, midges, bedbugs ...), and in particular mites.

The rarity of scabies in our boroughs can be explained by the absence of the species *Sarcoptes scabiei* in the homes studied. Indeed this species involved in the appearance of scabies, evolves frequently by small epidemics (Bouvrès and Chosidow, 2010).

Results from other studies have shown a higher prevalence of atopic dermatitis in urban and highly polluted areas (Hüls *et al.*, 2018).

In a prospective study conducted by Lenga *et al.* (2013) in Brazzaville, a prevalence of 70% of patients with popular urticaria, with vectors for haematophagous arthropods, is reported. Our results show a low prevalence of atopic eczema. It is explained by its multifactorial origin. Indeed, it can be due to mites, insects but also to a genetic predisposition (Dharma *et al.*, 2018; Kim *et al.*, 2018).

The prevalence of 38.96% in children with allergic dermatitis in Borough 7 (Mfilou) and Borough 6 (Talangai) may be due to pollution, vegetation cover and a large hydrographic network. These factors favor the reproduction and development of arthropods (Eintyre, 2000; Alkished *et al.*, 2017; Hüls *et al.*, 2018).

Three species of dust mites in studies in the Maghreb and sub-Saharan Africa were represented by the species *D. pteronyssinus*, *D. farinae* and *Blomia tropicalis* (El Fekih *et al.*,

2014). In our study, all the species mentioned were found outside *Blomia tropicalis*, which is frequently observed in sub-Saharan Africa, the Maghreb, South America and South-East Asia (Guilleminault et Viala-Gastan, 2017).

Our results on the dominance of house dust mites are similar to those of the Maghrebian study and sub-Saharan Africa, since of the 727 specimens of mites identified, 75.37% were of the species *D. pteronyssinus*, 23.93% *D. farinae* and 0.68% of *Ixodes ricinus*. However, we note the absence of the species *Blomia tropicalis*. This situation can be explained by the fact that this species grows in areas where the temperature is on average higher than in Congo. In a study of house dust mite allergy, Pauli and Bessot (2013) showed that temperatures between 25 and 32 °C and a relative humidity of 60 to 80% RH, are necessary for the optimal development of mites. These variations are close to our results and allow us to understand the abundance of the species *D. pteronyssinus* in Brazzaville. Surveys of children with dermatoses have established a relationship between dermatosis and the causative agent. Indeed, 88.09% of them have indeed revealed that they were frequently stung out of their homes, in their plots or during walks.

It is actually difficult to link the dermatoses observed to aggression by domestic mites. This situation is the subject of many controversies on the prevalence of dermatoses varying from one geographical area to another. The direct action of arthropods on the skin is to be revealed to understand the mode of aggression brought on by mites, causing dermatological disturbances observed with popular urticaria, eczema or scabies.

CONCLUSION

The study carried out in the houses of four districts of the city of Brazzaville revealed the presence of arthropods, mainly represented by mites. These three species, *D. pteronyssinus*, *D. farinae* and *Ixodes ricinus*, were observed from the dust collected under the carpets, beds and sheets of 40 houses. A total of 727 arthropods were harvested from the dwellings visited and the results for 212 inhabitants of which 145 were children, showed that 28.96% of them had dermatitis. The results obtained further showed that the abundance of arthropods seems to be related to an average temperature of 27 °C, for a relative humidity of 73.5% RH. Three dermatoses were mainly observed in children aged between 3 and 9 years: popular urticaria, atopic dermatitis and scabies. Popular urticaria emerged as the most important dermatosis with a prevalence of 86%, followed by eczema at 12%, then scabies with 2%.

Acknowledgments: The authors are particularly grateful to all those who made this work possible. This is the case of Mr. Nsika Nsimba Pharaïlde, the heads of neighborhoods and blocks of the boroughs investigated.

Bibliography

1. OMS. 2016. Maladies à transmission vectorielle, site officiel, 176p.
2. Xu F, Yan S., Li F., Cai M., Chai W., Wu M., Fu C., Zhao Z., Kan H., Kang K., Xu J. 2012. Prévalence de l'eczéma atopique chez les enfants en Chine. *PLOS one*, 7 : 361-74.

3. Barbarot S. 2016. Physiopathologie de la dermatite atopique et perspectives thérapeutiques systémiques. Réalités thérapeutiques en dermatovénérologie, 256, cahier 1.
4. Lenga-Loumingou I.A 2015. Profil épidémiologique des dermatoses au C.H.U de Brazzaville, Ann UnivNgouabi(3): 21-25.
5. Lenga A., Lenga-Loumingou I.A., MabikaMoussounda S.M., Vouidibio J. 2013. Le prurigo stropulus à Brazzaville, manifestation des vecteurs et étude de quelques paramètres bioécologiques associés. *J. Pakistan zool*, 45 (1): 121-128.
6. Halken S. 2004. Prevention of allergic diseases in childhood: clinical and epidemiological aspects of primary and secondary allergy prevention. *Pediatr. tr. Allergy immunol.* 15:9-32.
7. Bitsindou P., Lenga A., Massamouna G.J. 2012. Aedes vectors of arbovirus un Brazzaville : assessment of larval surveillance indexees *International journal of advanced scientific and Technical research.* 2(6):436-445
8. Andjingbopou Y., Lenga A., Nzoumbou-Boko R., Bitsindou P., Douzina P.N, Mbelolo P. 2018. Situation épidémiologique de la Trypanosomose Humaine Africaine dans la commune de Bilolo en République centrafricaine. *Bull. Soc. Pathol. Exot.* 111 :12-16
9. Pajot F. X. 2008. Les poux (Insecta, Anoploura) de la région afrotropicale. IRD Edition, 293 p.
10. Delaunay P., Cannet A., Blanc V., Berenger J.M, Izri A, Choissidow O., Marty P. 2012 Le retour des punaises de lit. *Médecine thérapeutique/pédiatrie* , 15 (2): 85-91.
11. Canteaume F., Imbert C. 2014. Le point en 2013 sur les envenimations liées aux arthropodes en Guyane française. *Bull. Soc. Pathol. Exot.* 107: 31-38.
12. Peres G., Yugar L.B.T., Haddad J. V. 2018. Breakfast, lunch, and dinner sign: a hallmark of flea and bedbug bites. *An Bras Dermatol.* 93 (5): 759-760.
13. Demain JG. Papularurticaria and things that bite in the night. *Current allergy and asthma report* 3 (4) : 291-303. August 2003.
14. KrantzG.Wand Walter D.E. 2009. A manual of acarology. Third Edition. 805p.
15. Emodi I.J., Ikefuna A.N., Uchendu U., Duru U.2010. Skin diseases among children attending the out patient clinic of the University of Nigeria teaching hospital, Enugu. *Afr. healtsci.* 10: 36-6.
16. Ade gbidi H., Degboe B., Saka B., Elegbe de A., Atadokpe de F., Koudoukpo C., Yedomon H., do-AngoPadonou F. 2014 Profil des dermatoses immunoallergiques chez les enfants dans le service de dermatologie du CNHU-C (Bénin); *Médecine et Santé Tropicales*; 24: 446-448.
17. Arsouze A., Fitoussi C., Cabotin P.P. 2008. Motifs de consultation en dermatologie des sujets de Peau noire d'origine Africaine et Antillaise : enquête multicentrique en région Parisienne. *Ann. Dermatol. Vénérol*, 135 : 177-82.
18. Bouvresse S, Chosidow O. Scabies in healthcare settings. 2010L. *Curropin infect dis. Apr* : 23 (2) : 111-83.
19. Hüls A., Abramson M.J., Sugiri D., Fuks K., Krämer U., Krutmann J., Schikowski T.2018. Nonatopic eczema in elderly women: Effect of air pollution and genes. *J Allergy Clin. Immunol.*143(1):378-385
20. Dharma C, Lefebvre D.L., Tran M.M., Lu Z., Lou W.Y.W., Becker A.B., Mandhane P.J., Turvey S.E., Moraes T.J., Azad M.B., Sears M.R.2018. Diagnosing atopic dermatitis in infancy: Questionnaire reports vs criteria-based assessment. *Paediatr.Perinat.Epidemiol.* 32(6): 556-567.
21. Kim J.T., Kim H. S., Chun Y. H., Yoon J. S. Kim H.H.2018. Effect of multi-ethnicity and ancestry on prevalence of allergic disease. *J MicrobiolImmunol Infect.* 12(75):159-168
22. Eintyre N. 2000. Ecology of urban arthropods: a review and call action, *Ann. of the entomol. Soc. of America*, 4(1): 825-835.
23. Alkished A.A., Peterson A.T., Sammy A.M..2017. Climate change influences on the potential geographic distribution of the disease vector tick *Oxodesricinus* *PloS ONE* 12(12.): eO189092
24. Hüls A., Klumper C. , MacIntyre E.A., Brauer M. Melen E. 2018. Atopic dermatitis: interaction between genetics variants of GSTP 1, TNF, TLR2 and TLR4 and air pollution in early life. 29(6): 596-605.
25. El Fekih M., MjidZ., Souissi A., Ben Hmida Y., El Gueddari H., Douagui M., Ouedraogo M., Dan Aouta M., Beji 2014. Étude de la sensibilisation aux 3 acariens (*Dermatophagoïdes pteronyssinus* , *Dermatophagoïdes farinae* , *Blomiatropicalis*) au Maghreb et en Afrique subsaharienne dans une population de patients consultant pour une rhinite et/ou un asthme, *Revue française d'allergologie* 54 107-112.
26. Guilleminault L., Viala-Gastan C. 2017. *Blomiatropicalis* : un acarien sous les tropiques; *Blomiatropicalis* : a house dust mite in the tropics. *Rev. desMalad. Resp.* 34(8): 791-801
27. Pauli G., Bessot J.C. 2013. Les acariens : biologie écologie et actualités des allergènes moléculaires. *Rev. Fr. Allergol.*53:45-58.

How to cite this article:

Lenga Loumingou Ida Aurelie *et al* (2019) 'Demonstration of Some Domestic Mite Species Incriminated in Dermatological Diseases in Brazzaville (Congo)', *International Journal of Current Advanced Research*, 08(04), pp. 18285-18289. DOI: <http://dx.doi.org/10.24327/ijcar.2019.18289.3492>
