AEROALLERGENS IN NAMIBIA

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ABSTRACT
Namibia is a vast and sunny country with a non-polluted atmosphere of beauty, tranquillity and ... allergens. The allergenic symptomatology is as diverse as its climate, geographical conditions and eleven different ethnic groups. Being one of the most fascinating countries in Africa, it is also an unexploited paradise for eager and inquisitive allergologists. Charles Franklin Kettering once said 'Research is an organized method for keeping you reasonably dissatisfied with what you have.' With the School of Medicine of the University of Namibia now in its fourth year, new doors have been opened for research. The combination of well-equipped laboratories and the knowledge of lack of research data are all the motivation needed to 'increase what we have' and be more 'satisfied'.

The 824 292 square kilometres that comprise Namibia not only accommodate a population of more than 2.1 million but also have all the essential ingredients for an 'allergenic soup'.

CLIMATE INFLUENCES
Namibia enjoys an average of more than 300 days of sunshine per year. Approximately 50% of Namibia's surface area receives less than 250 mm rain annually. The interior of the country has two rainy seasons, one short and one long. The short rains may fall any time between October and December; the main rainfall period occurs between January and April. The Atlantic Ocean's cold north-flowing Benguela current dominates the weather and climate in the coastal area. It accounts for the very low rainfall of 50 mm or less per year, frequent dense fog which occurs generally from late afternoon until mid-morning (Fig. 1) and overall temperatures lower than the rest of the country. This high humidity in combination with high daytime temperatures creates the ideal milieu for the continued existence of the house-dust mite. Occasionally during winter a condition known as 'East Weather' (Afrikaans: 'Oosweer') occurs: a hot, dry wind blowing from inland to the coast. As the area east of the coast is a desert, these winds can develop into sandstorms as seen in Figure 2 – the photograph was taken at 08h00. The detrimental effect of this dust pollution as well as the pollen which the wind carries from inland to the coast is obvious.

Fig. 2. Sandstorm as a result of 'East Weather' ('Oosweer') in Swakopmund.

TREE AND GRASS ALLERGENS
The approximately 390 indigenous grass species represent almost 10% of Namibia's flora. Varying with the rainfall, the vegetation changes from fairly dense bush and mopani
savannahs in the far north to scattered thorn trees and thorn scrubs in the central regions to desert type scrub in the south and west (Fig. 3).

The *Prosopis* tree (Mexican mesquite, *Prosopis juliflora* and *Prosopis glandulosa*) is one of the most notorious trees in Namibia, causing seasonal allergic manifestations. It is native to North America and is primarily found in desert and drylands areas of south-western USA and northern Mexico. It is commonly called the mesquite or honey mesquite and in Afrikaans, *muskietboom*. The seeds are easily dispersed by wind, birds, wild animals and livestock. The seeds pass unaltered through the digestive tract. In desert regions and when burned or harmed, mesquites grow into thorny shrubs forming a dense bush, but under favourable conditions may develop into trees (Fig. 4). The vast amount of pollen it produces is spread by insects as well as by the wind. The first *Prosopis* was planted in 1897 at Okahandja Research Farm. It was used by the early German settlers and missionaries for shade and as fodder. It is found abundantly in Windhoek, Okahandja, Omaruru, Gobabis and Rehoboth, but not in the wetter north-eastern parts. This tree, which flowers in September to December with a peak in October/November, is also found in the western and drier areas of the Republic of South Africa. Allergic rhinitis and allergic bronchial manifestations in the abovementioned regions are well recognised as seasonal during the flowering months and are ascribed to the *Prosopis* pollen (Fig. 5).
A survey by Ordman\(^3\) regarding the aerobiology of Windhoek (1966-1968) indicated that the grass pollen season commences in December/January and reaches a peak in March/April after which it falls rapidly, with little in May. A slight increase in grass pollen was also found during October - probably concurrent with the short rainy season. A follow-up study by me, regarding the aerobiology of Windhoek, was commenced in August 1993 for a period of 2 years. Very similar results were obtained, although the high incidence of cypress pollen peaking in August of 2 years. Very similar results were obtained, although during October – probably concurrent with the short rainy season in May. A slight increase in grass pollen was also found during October - probably concurrent with the short rainy season.

**HOUSE-DUST MITES AND COCKROACHES**

The prevalence of *Dermatophyoides pteronyssinus* was investigated during 1995 by means of bed and carpet sampling in Windhoek, as well as in the coastal towns of Oranjemund and Swakopmund. Very low counts, <2 µg/g dust, were found in Windhoek. In many homes in Swakopmund, and especially Oranjemund, the levels were generally very high, >100 µg/g dust, which may explain the high incidence of asthma and rhinitis in children in these areas.

In 2005 skin-prick testing for the cockroaches *Periplaneta americana* and *Blatella germanica* was performed on 156 randomly chosen patients from my ear, nose and throat practice (Oranjemund 70, Swakopmund 50 and Windhoek 36). The total of positive tests indicated a prevalence of 28.97%, slightly lower than the worldwide sensitivity of 30-70%. However, as observed by Potter et al.\(^4\) there was no significant difference between the rate of sensitisation to cockroach in the coastal towns (Swakopmund and Oranjemund) and the inland city of Windhoek. Sensitisation to *Periplaneta americana* was also more abundant in the low-altitude coastal regions with *Blatella germanica* sensitivity more prevalent in Windhoek (mean altitude of 1657 m). This finding is in line with the information collected by Lopata et al.\(^5\) Many patients tested positive for both cockroach species.

**RECENT ALLERGY STUDY**

During July and August 2013, 150 patients, who had positive radioallergosorbent tests (RASTs), were selected from my practice at random - 50 from coastal and 100 from inland towns/cities. One of the criteria was that they needed to have been residential in the specific region either since birth or for at least 10 years prior to their RAST. The average age was 24.8 years (youngest 2 years, oldest 64 years) with 84 males and 66 females. The main aeroallergen for the inland regions is grass pollen; 91% tested positive with an average RAST class of 3.8 compared to 44% (class 2.1) for the coastal regions. For the latter, the house-dust mite tested positive in 96% (average class 4) and 53% (class 1.6) inland. There did not seem to be a major difference in prevalence between the coast and inland regarding sensitivity to the mould mix (coast 22%, inland 28%). *Prosopis* pollen tested positive in 38.3%. Of the patients tested for this tree in Windhoek, 48.8% were positive and in Okahandja all tested were positive (100%). The prevalence of sensitisation correlated with the geographical distribution of this tree.

As a result of a suspicion arising from unacceptable house-dust mite mix sublingual immunotherapy (SLIT) results in Swakopmund, I recently started testing for *Blomia tropicalis*. Of the 38 RASTs, 21% came back positive, the majority from the coastal towns of Swakopmund and Walvis Bay. This finding will be investigated further.

The coexistence of First and Third World elements, and the diversity of climatic and geographical conditions, as well as variations in the socio-economic circumstances of the eleven different ethnic groups, make Namibia not only one of the most interesting countries in Africa, but also an unexploited paradise for the eager and inquisitive allergologist.

**Declaration of conflict of interest**

The author declares no conflict of interest.

**REFERENCES**