

# Comparison of karyotype variability in the genera *Uroplectes* and *Parabuthus* scorpions (Scorpiones: Buthidae)



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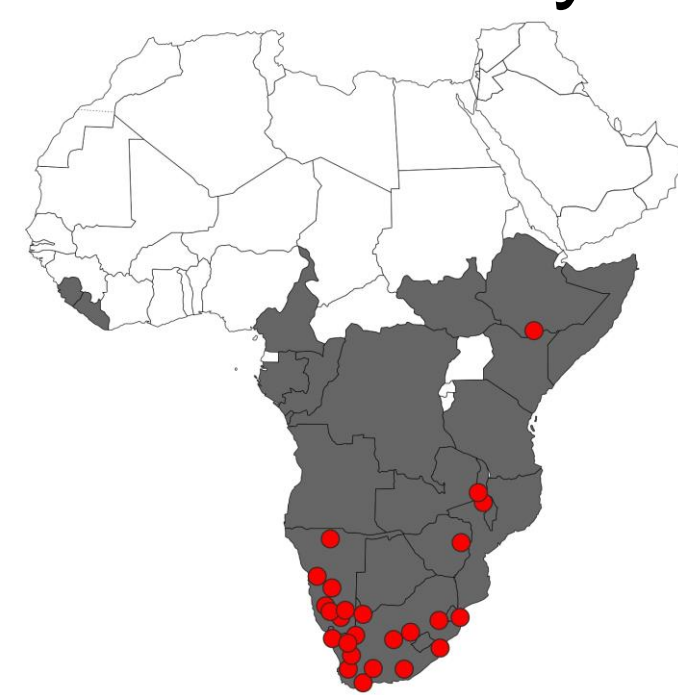
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*Uroplectes fischeri*

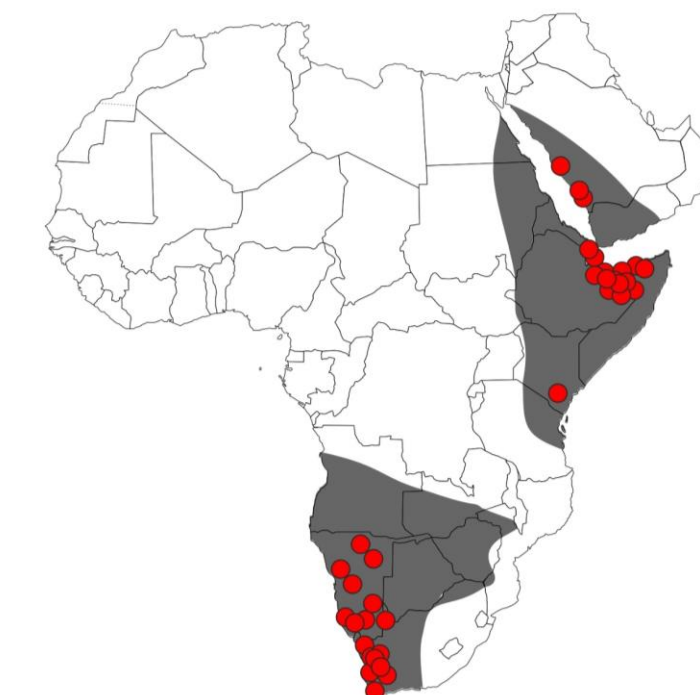


Family Buthidae (1255 species) is the most diversified family of scorpions with distribution on all continents except Antarctica. The species of this family are most often cytogenetically studied within the order Scorpiones and show remarkable cytogenetic characteristics such as holokinetic chromosomes, achiasmatic meiosis and frequent chromosomal rearrangements in the karyotypes. However, the different genera of this family show different levels of intra- and interspecific variability of cytogenetic characteristics - you can see it in Schneider et al. 2024



**AIMS:** to compare the cytogenetic variability of the two buthid genera *Uroplectes* (34 described species) and *Parabuthus* (41 described species), which are represented on the African continent. We also tried to identify cytogenetic interspecific differences that may help us in the taxonomy of both genera

**MATERIAL:** we analysed  
13 *Uroplectes* species  
(72 specimens from 25 localities)  
19 *Parabuthus* species  
(88 specimens from 35 localities)



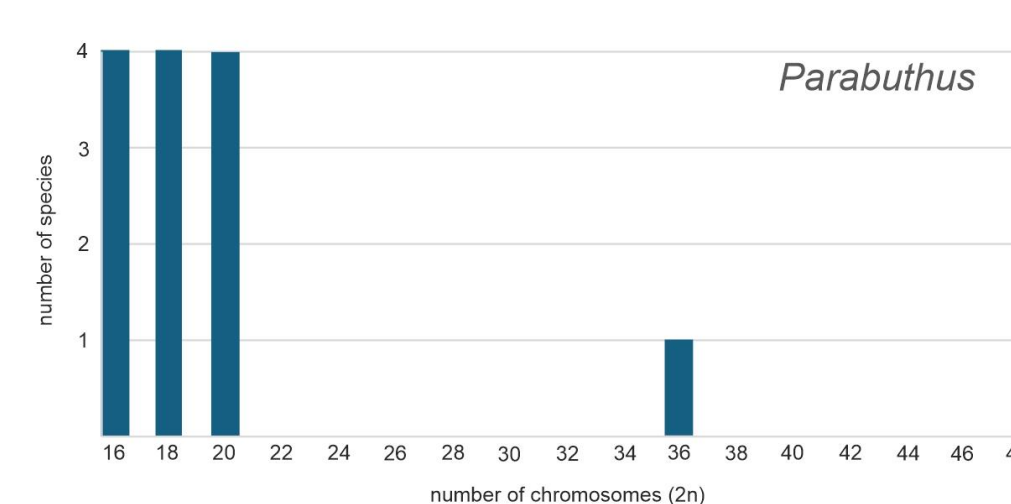
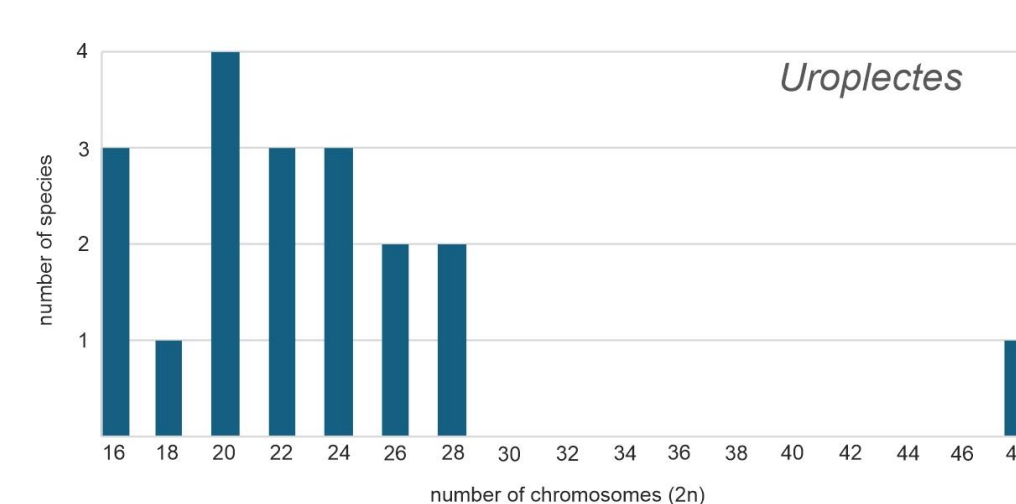
*Parabuthus abyssinicus*

**METHODS:** Chromosome preparations made by the "plate spreading" method and stained with 5% Giemsa. For fluorescence *in situ* hybridization (FISH), we used indirectly labeled probes, specifically a probe for telomere and a probe for 18S rDNA detection according to Štáhlavský et al. 2020

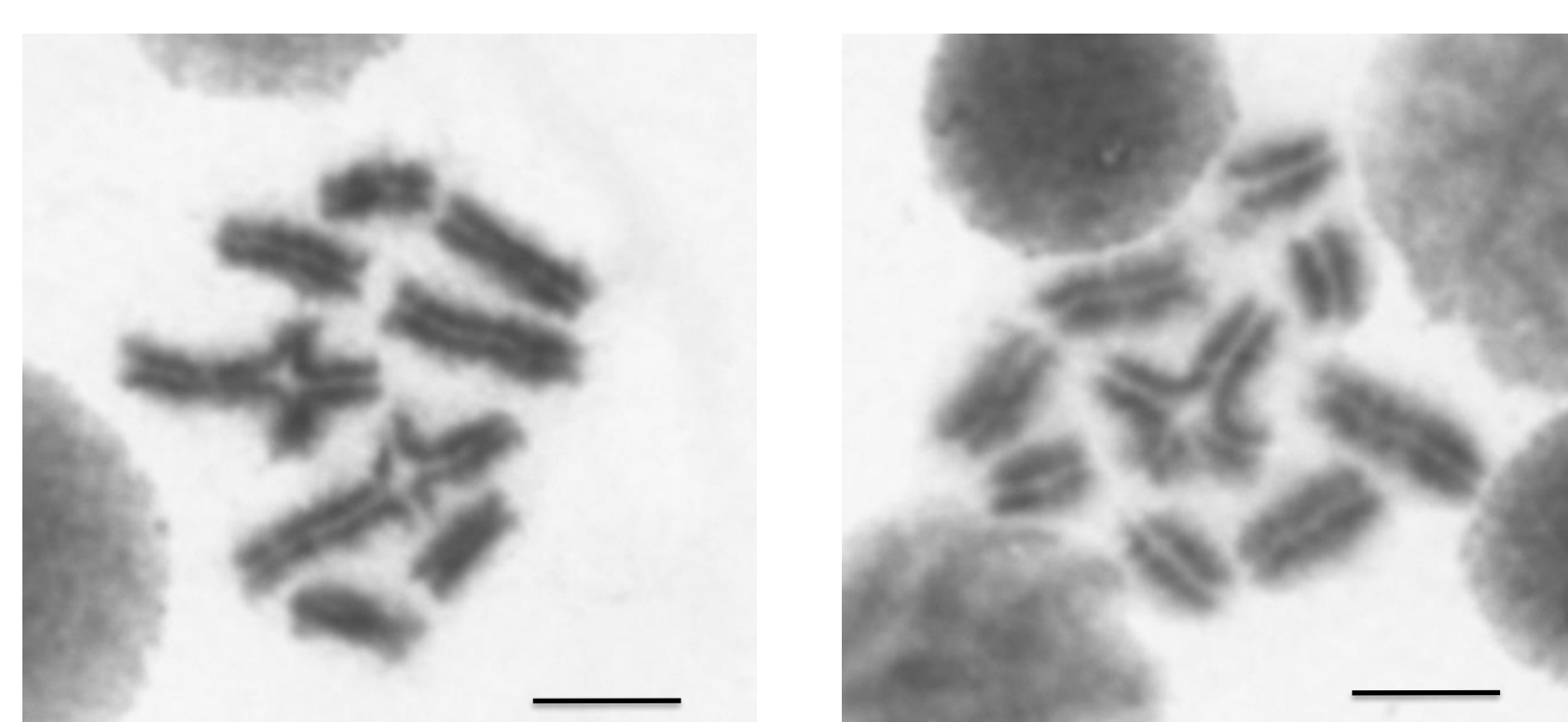


*Uroplectes* shows a range of  $2n=16-28$  with the only exception reported for the species *Uroplectes carinatus*  $2n=48$  (Newlands & Martindale, 1980), which, however, considering all other data, is probably an erroneous observation. In three species (*Uroplectes flavoviridis*, *Uroplectes lineatus*, and *Uroplectes planimanus*), we found different  $2n$  between distant populations. Whether it is intra- or interspecific variability needs to be tested using other methods.

## Variability of chromosome number ( $2n$ )

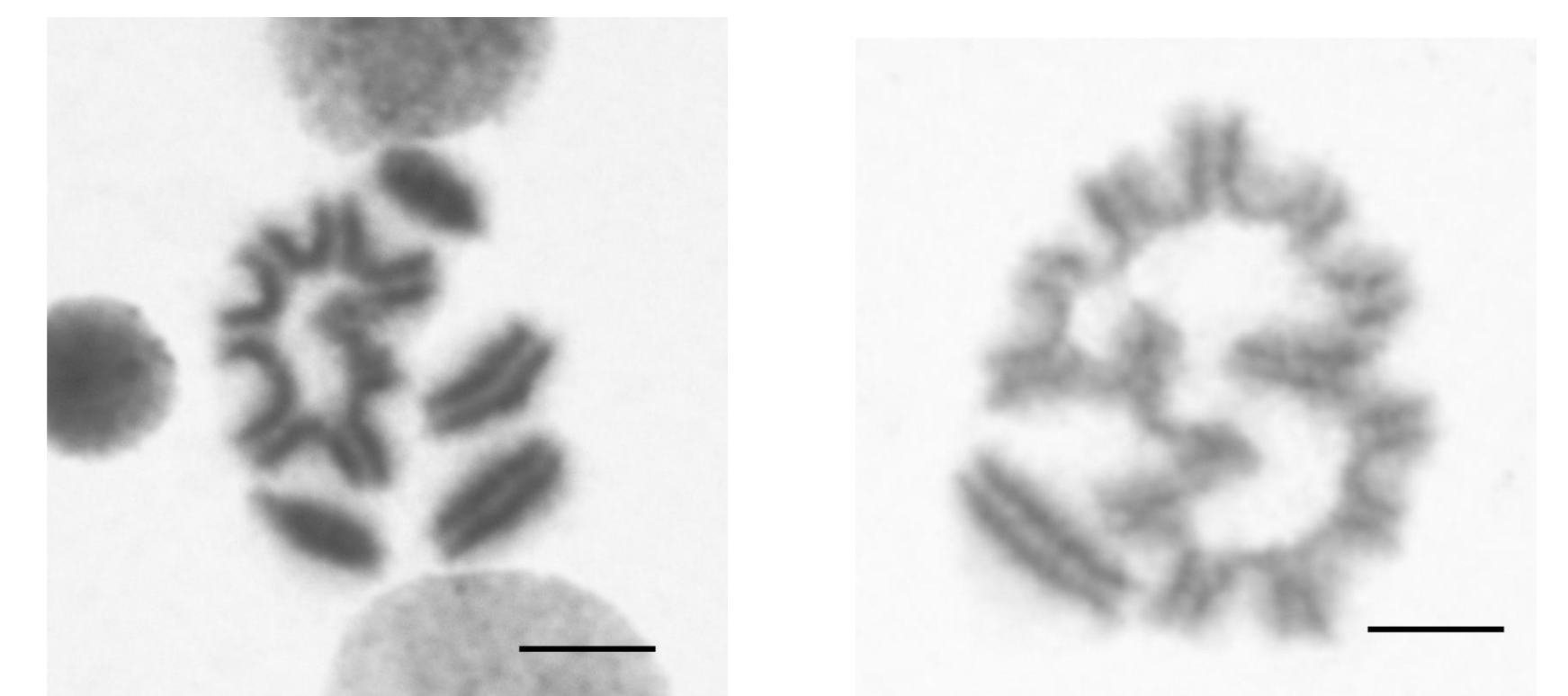


*Parabuthus* shows a lower range of  $2n=16-20$ . In our study, we found a different  $2n=18$  in *Parabuthus mossambicensis* than the previously published data of  $2n=36$  (Newlands & Martindale 1980). This probably represents a misinterpretation in the older analysis. The second difference found in *Parabuthus raudus* may actually represent different species from Namibia ( $2n=20$ ) (present study) and Zimbabwe  $2n=18$  (Newlands & Martindale, 1980).



*Uroplectes formosus* ( $2n=20$ ) with variable multivalent associations.

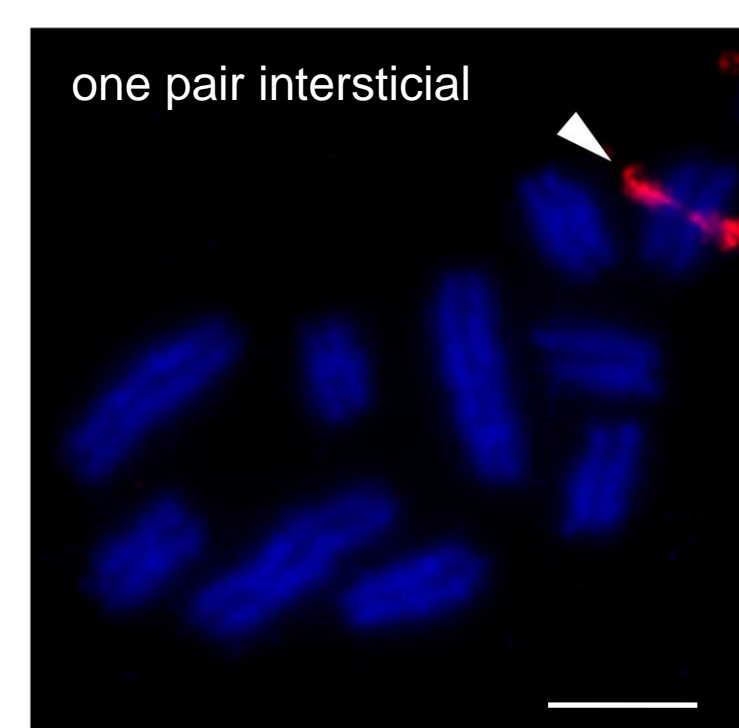
**Multivalent associations**  
Both genera show a similar frequency of rearrangements that cause multivalents. In addition, associations involving higher numbers of chromosomes during meiosis appear in both genera. This similarity suggests the same mechanisms leading to the formation of these changes in both genera.



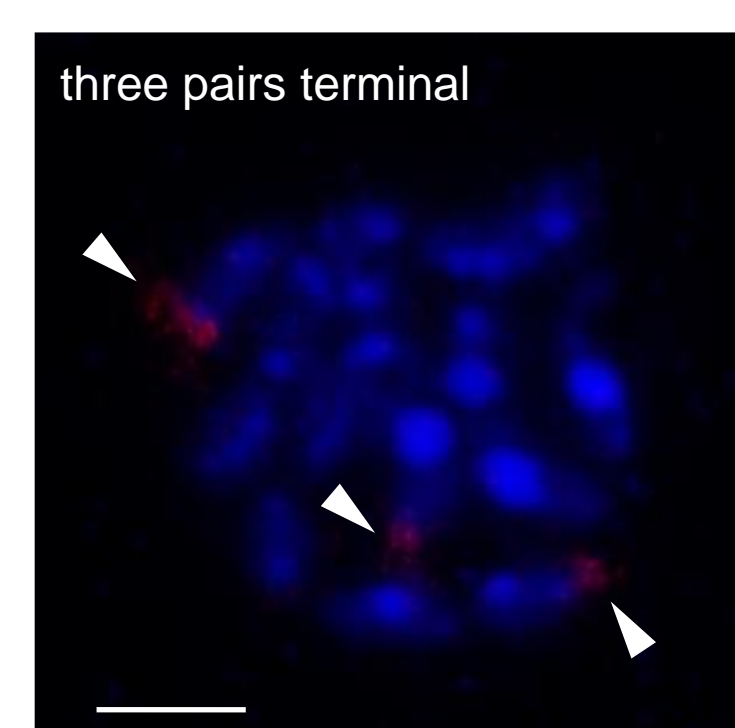
*Parabuthus dorisae* ( $2n=16$ ) and *P. quincyae* ( $2n=16$ ) with different multivalent associations.

## rDNA clusters

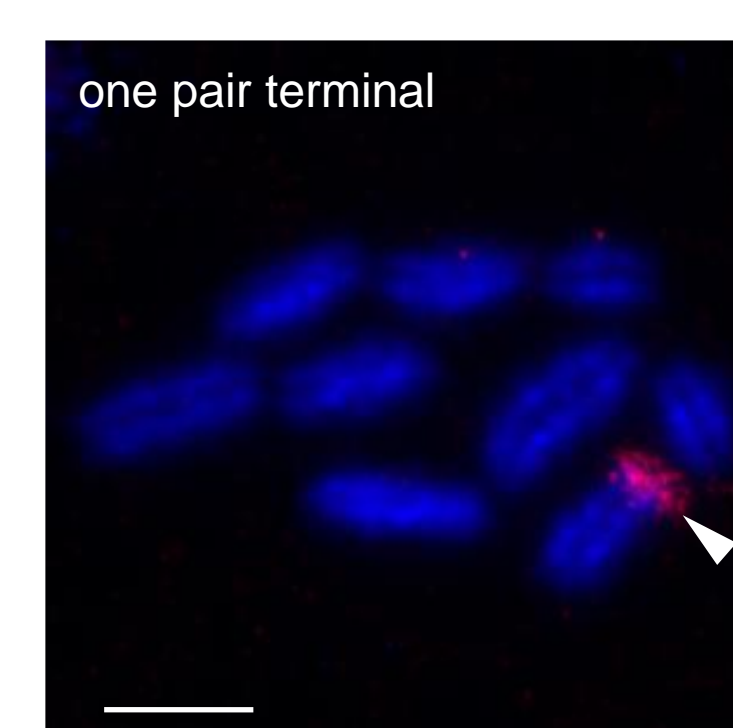
*Uroplectes* have a variable number of 18S rDNA clusters (**1-3 pairs**), which can be located either in **a terminal or interstitial position**. This variability probably reflects a higher rate of chromosomal rearrangements within this genus.



*Uroplectes planimanus* ( $2n=20$ )



*Uroplectes otjimbinguensis* ( $2n=20$ )

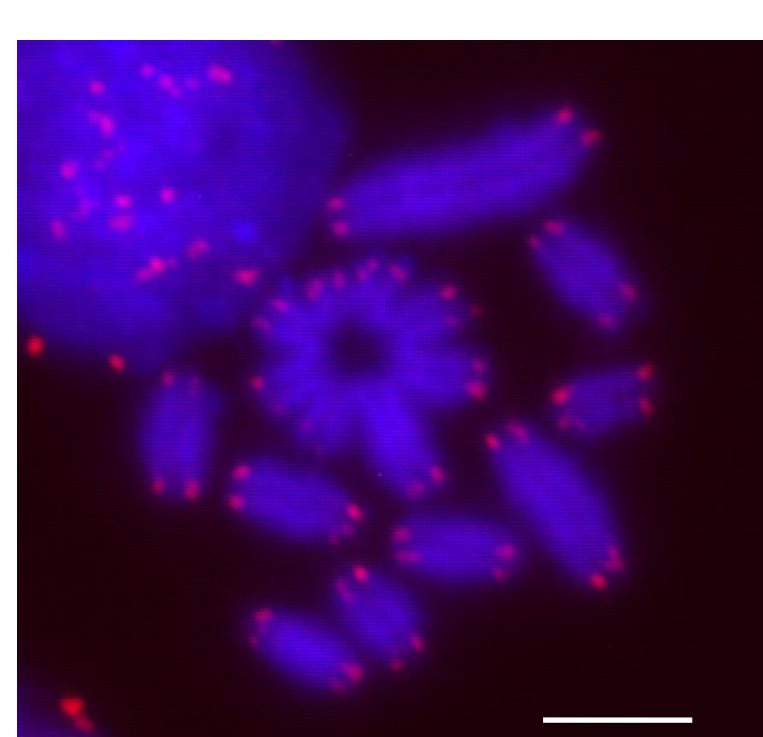


*Parabuthus brevimanus* ( $2n=18$ )

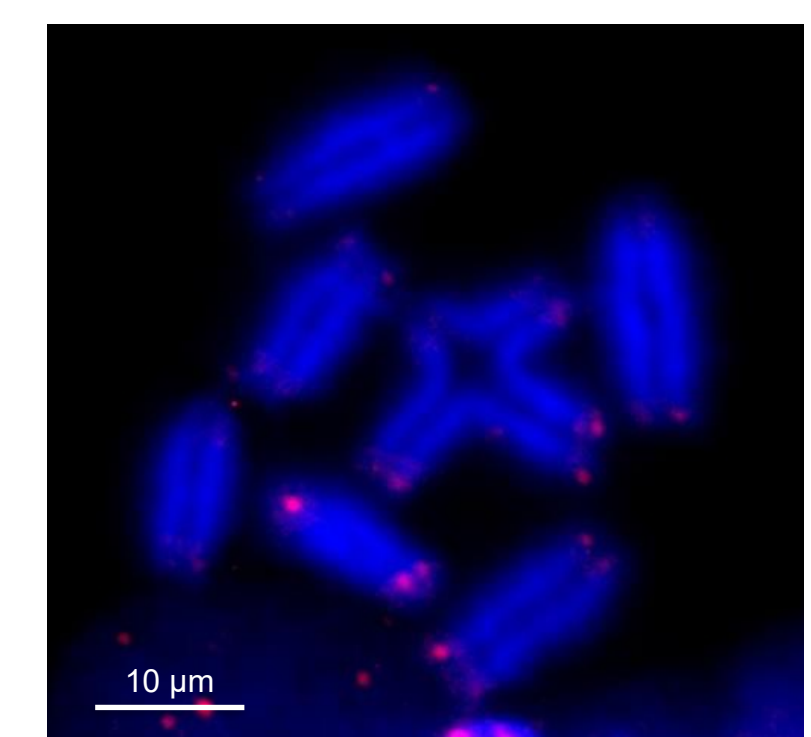
*Parabuthus* always has only **one pair** of 18S rDNA clusters, which is located in the **terminal position**. This trait appears to be conservative throughout the genus. Although we cannot confirm the exact homology of the chromosomes carrying these genes at this time.

## Telomeric motif (TTAGG)<sub>n</sub>

In both genera, we found only the presence of the terminally located telomeric motif (TTAGG)<sub>n</sub>. In no species could we identify interstitial signals that would prove remnants of a possible original telomere. This fact has also been found in other species of the family Buthidae and documents the rapid elimination of this repetitive motif after chromosomal rearrangements.



*Uroplectes otjimbinguensis* ( $2n=20$ )



*Parabuthus kabateki* ( $2n=16$ )