

**WEEK 3** PLANT AND INSECT DIVERSIFICATIONS: INTERVIEW WITH A  
PALAEOBOTANIST

ACT – Anusuya Chinsamy-Turan

JA – John Anderson

ACT I'm at the Palaeontological Society of Southern Africa meeting that is being held at the University of Stellenbosch in Cape Town and I'm absolutely thrilled to have with me John Anderson. Now John and his wife, Heidi Anderson, have written all these wonderful books about the history of plant evolution in Southern Africa and also in the world, not just Southern Africa. But one of the really important things is that they've given us an unprecedented account of the diversification of plants. John, do you want to share with us some of this knowledge that you have. I know you have so much to say about plants, but can you tell us something about them?

JA Okay, shall we run through time here. There's the end-Permian extinction, 250 million years ago, 252 million years ago. There's the *Glossopteris* flora which completely dominates Gondwana...

ACT In the Permian?

JA In the Permian, occurring right across Gondwana, and then it essentially disappears at the end of the Permian as do many insect orders and so on as well, and then we come into the *Dicroidium* flora in the Triassic which again spreads right across Gondwana. And what do you think is it that makes the *Dicroidium* flora so successful in the Triassic whereas the *Glossopteris* was completely extinct? Do you have any ideas about that?

JA Well, of course, we're starting... it's like a teacher cleaning the blackboard. Most of the plants are gone, most of the animals are gone. Let's say 90% of the species are gone at the end of the Permian and there's a complete new eco space to fill globally and *Dicroidium* just happened to be extremely successful at doing that, along with a lot of other classes of plants as well. That's just one class of plants.

ACT And richest diversification is certainly in the Triassic then?

JA Well, in the late Triassic. In the late Triassic. At the time of the Molteno, at the end of the Permian, 90% of everything gone and then there's an exponential radiation of new diversity through the Triassic and the Molteno is pretty much at the peak of that, and that is pretty much at the time of the origin of the dinosaurs, of the origin of the mammals, at the time of the greatest diversity of beetles up until then. More or less the same kind of diversity of beetles today and beetles today, of course, are the most diverse of all... All orders of insects, yes. All orders of insects, of just about anything, and it seems to be the same down there in the late Triassic.

ACT And the flowering plants come much later than, isn't it?

JA They possibly have their origins at that same time, just like the mammals. Pretty much at the same time.

ACT In the Triassic?

JA In the Triassic...

ACT But their height of diversification basically...

JA Middle Cretaceous, I would say sort of 100 million years ago is where they really radiate to great diversity through to today.

ACT And, of course, with them are the insects diversification, isn't that true?

JA So at that same time when the flowering plants radiated diversity 100 million years ago, middle Cretaceous, the... well, the insects originated way earlier but at that same sort of time the pollinating groups, the major... the big four, the butterflies, the Hymenoptera, including the bees and the wasps and the ants, and beetles to a lesser extent, and other things to a lesser extent, they all radiated to great diversity along with the flowering plants. They really co-evolve. So the insects originated round about 450 million years ago and this represents different orders. These major branches in this tree, time tree, it gets slotted against time, the major orders of insects, but particularly interesting here in terms of the flowering plants if you see these tight branches over here these are the major pollinating groups of insects...

ACT And we see the butterflies, we see the bees...

JA The wasps, the bees, the ants. This grey bar here represents the moment of great diversification of the flowering plants and you'll see that this coincides exactly with that. This great branch here coincides beautifully with that.

ACT So this actually is the co-evolution of plants, pollinating insects and plants.

JA Absolutely so. And if I may just digress for a second, I've just come back from London a few days ago and visited Kew, Kew Gardens, which I dearly love and they've got a lovely great new sculpture of a beehive, a huge thing. It's a huge concern of mine is the current sixth extinction. There, for instance, flowering plant meadows in England during my lifetime have, according to Kew's data, 97% of it has disappeared, these beautiful flowering plant meadows, 97%... there's a great diversity of bees that exists because of these flowering plant meadows...

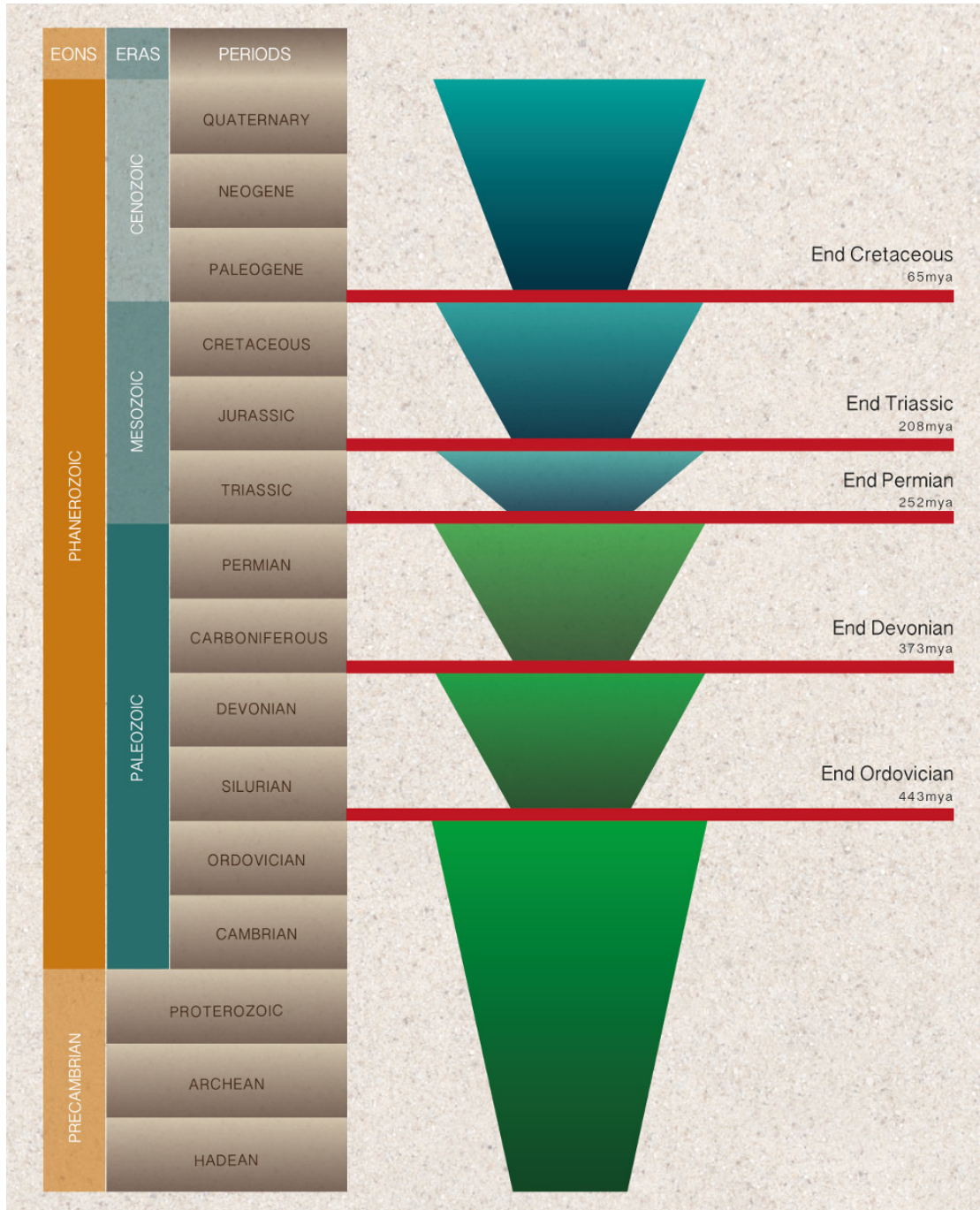
ACT So I guess their numbers are also on the decline then.

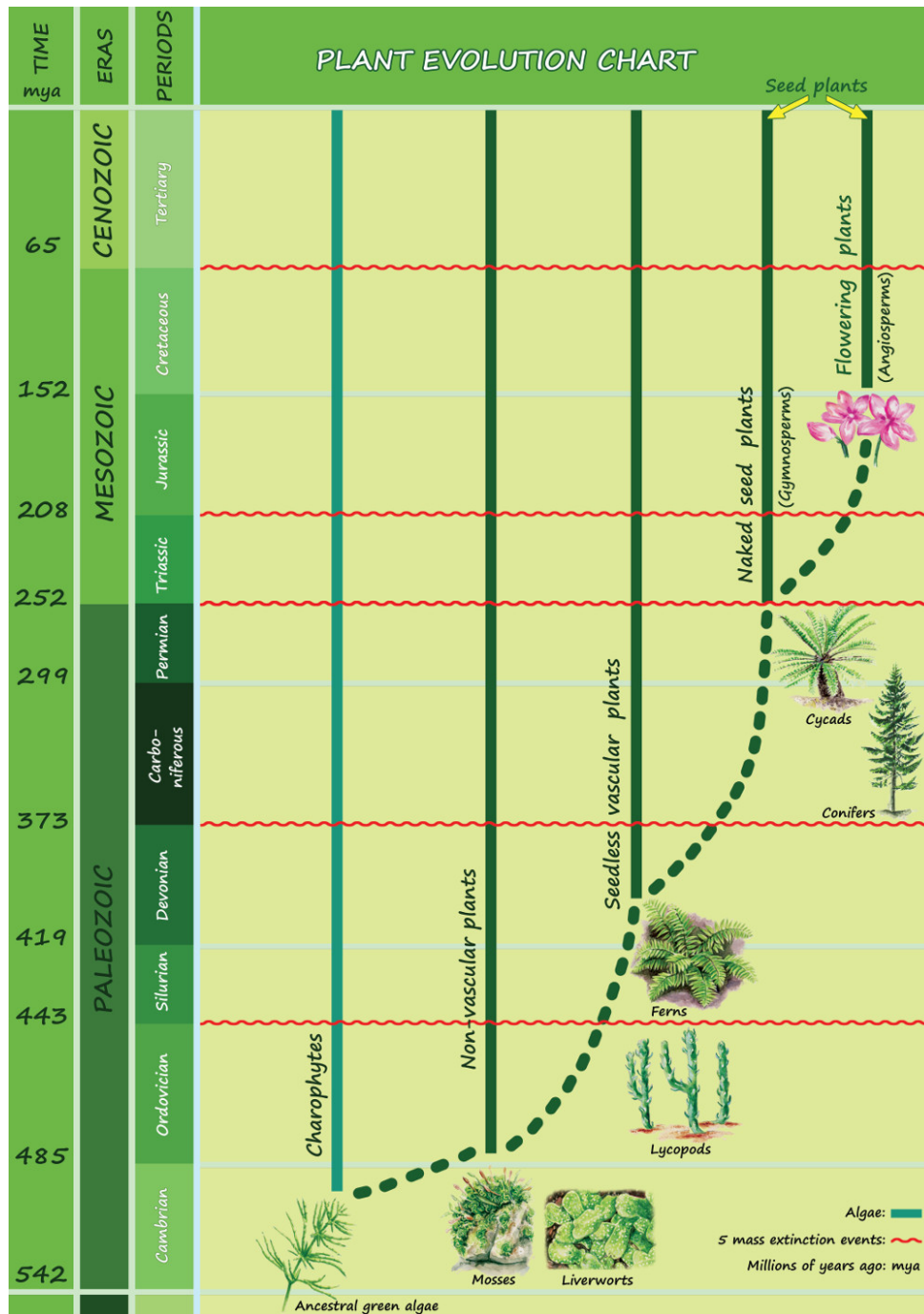
JA They're in big trouble and we're in the big trouble if the bees disappear. So we wipe out the meadows, we wipe out the bees, we wipe out ourselves.

ACT Exactly. No, it's really fascinating to understand this whole diversity of life and to understand how fragile our planet is.

JA Not the planet, our world. The planet will carry on happily but our world...

ACT The biodiversity on our planet will change for sure. Thank you very much. It's been wonderful talking to you and I think it's been absolutely fabulous to hear all the experiences that you have, not just about plants, but about insects, and just modern fauna as well, and flora.





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