## Individual protein quantities in eucalypt leaves across eastern Australia

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Nitrogen concentration in plant tissues, as an indicator of total protein, has been widely used to model or interpret photosynthesis, respiration and herbivory. Different proteins obviously have different functions, but it has not previously been practicable to quantify individual proteins in most ecological work. We have developed new proteomic methods that permit one-pass quantification of more than 2000 proteins. Here we report patterns in calvin-cycle and photosystem proteins across 27 eucalypt species along major environmental gradients. Calvin cycle proteins per leaf area increased towards lower temperatures, presumably because they function more slowly when cold, and to a lesser extent towards lower rainfall, presumably to achieve stronger drawdown of CO2 concentration within the leaf and hence improved water use efficiency. This was achieved in part via increasing leaf mass per area, though there was considerable variation in protein concentration per leaf mass also. Photosystem proteins similarly increased with decreasing temperature, and also with decreasing illuminance. In other words, the ratio of photosystems to calvin cycle increased in lower light. We expect this study to be harbinger of many that will address a wide range of ecological functions via quantification of individual proteins.