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Proof-theoretic relations between Higman's and Kruskal's theorem.

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Higman's lemma and Kruskal's theorem are two of the most celebrated results in the theory of well quasi-orders. In his seminal paper [1], G. Higman obtained what is known as Higman's lemma as a corollary of a more general theorem, dubbed here Higman's theorem. J.B. Kruskal was well aware of this more general set up; in the very end of his famous article [2], he explicitly stated how Higman's theorem is a special version, restricted to trees of finite branching degree, of Kruskal's own tree theorem. The equivalence has been subsequently formalized [3]. We transfer Pouzet's proof in the context of Reverse Mathematics, proving its validity over RCA_0 and establishing a rich schema of proof-theoretic implications; moreover, extending the investigations made by Rathjen and Weiermann [4], we calculate the proof-theoretic ordinals of the different versions of Kruskal's theorem involved.

[1] G. Higman, *Ordering by divisibility in abstract algebras*, ***Proceedings of the London Mathematical Society***, vol. 3 (1952), no. 2, pp. 326–336.

[2] J.B. Kruskal, *Well-quasi-ordering, the tree theorem, and Vazsonyi's conjecture.*, ***Transactions of the American Mathematical Society***, vol. 95 (1960), pp. 210–225.

[3] M. Pouzet, *Applications of well quasi-ordering and better quasi-ordering*, ***Graphs and order*** Publisher Springer, Year 1985, pp. 503–519.

[4] M. Rathjen and A. Weiermann, *Proof-theoretic investigations on Kruskal's theorem*, ***Annals of Pure and Applied Logic***, vol. 60 (1993), pp. 49–88.