sexta[6], and LecRK-I.8 in *Arabidopsis* has a role in the induction of immune response triggered by egg extracts from *Pieris brassicae*[8], although no ligand for the latter lectin receptor kinases has been found. In recent years, it has become evident that insect feeding induces plant immune responses mediated by insect-derived herbivore-associated molecular patterns and by plant-derived damage-associated molecular patterns[7]. In this context, it is plausible that OsLecRK proteins function as PRRs.

Given that *Bph3* confers resistance to all BPH biotypes tested and to the white back planthopper, any OsLecRK1–3 ligand would have to be conserved across these insect species or universally produced by rice plants in response to infection by these pests. OsLecRK1–3 may also recognize distinct ligands.

Another possibility is that OsLecRK1–3 are not PRRs but rather signaling molecules associated with PRRs. Indeed, certain lectin receptor kinases, such as the *Arabidopsis* LecRK-VI.2, are known to associate with well-defined PRRs to positively or negatively regulate immune signaling[6]. Defining the roles of OsLecRK1–3 will require identification of rice proteins associated with them and of the plant- or insect-derived ligands that induce *Bph3*-dependent resistance.

Bph3 has conferred durable resistance to BPH in the Philippines for the past 30 years in rice varieties bred to carry this locus. However, introgression of genes through breeding often results in 'linkage drag', which can negatively affect agronomical performance through the transfer of deleterious alleles of neighboring genes or the creation of new interfering allele pairs. Cloning of the *Bph3* locus is a crucial step toward the development of high-performance resistant rice varieties because it enables precise marker-assisted selection for *Bph3* in breeding programs. Thus, the work of Liu *et al.*[2] opens up exciting biotechnological opportunities to engineer broad-spectrum insect resistance in rice and potentially in other cereals.

Recent studies have revealed that PRRs or associated proteins (including lectin receptor kinases) can be transferred by engineering across plant families and even plant classes[9,10]. It is tempting to propose that introduction of *OsLecRK1–3* by transgenesis could confer broad-spectrum resistance to planthoppers and potentially other insects in other agronomically important cereals, including maize or wheat, that suffer huge losses from insect pests. The breadth of applicability of *Bph3* will depend on the conservation of the ligands recognized directly or indirectly by OsLecRK1–3.

In conclusion, Liu *et al.*[2] have greatly advanced our understanding of mechanisms involved in plant resistance to insect pests and demonstrate that this knowledge enables new strategies to protect crops from damaging insects in a sustainable manner.

COMPETING FINANCIAL INTERESTS
The authors declare no competing financial interests.

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