

**Table S1. Amino acid sequences of AIOBPs and AICSPs obtained in the study.**

**OBP**

>AIPBP1

MADPRWQFTRFVCMFMASVMSKELLTKMSTGFTKVLDAKTELNAGDHIMQDMY  
NFWKEEYELVNRDLGCMVLCMANKLELIGDNQKLHHGKAEEFAKSHGADDGQAKQLV  
ALVHDCENQHQGVEDACSKMLEVSKCFRTKIHCLKWAPSMEVVMEEIMAAANA

>AIPBP2

MALHPPVTMTVRLALVVIASLVIA  
VESSQEIMKTLNFAKPLQDCKKEMDLPDVTTFDFYNFWKEGYEFTNRHTGCAIMCLSS  
KLELLDQELKLHHGKAQEFAMKHGADENMAKQLVEMIHSCAESTPDAADDPRMKALHV  
AQCCKNIHDLKWAPSIELIMGEVLAEL

>AIPBP3

MGRCSMFLVMLIMAVAVWKVEP  
SKDAMKYITSGFVKVLEECKKELNMDEHILADLFHFWKLEYSLLDRDTGCVIICMSKKLD  
LLDENGRMHGNAQEFALKHGAGEEVAAKIVTIIHECEKKFERDDDECLRVLEVAKCFRS  
GIHELDWQPKVQTVSEVLTEI

>AIGOBP1

MQAVRALVLLAAAGVLRA  
DVLVMKDVTLGFGQALDKCRKESDLTEEKMEEFFHFWREDFKFEHRELGCAIQCMSNYF  
NLLTDSSRMHHGNTEKFILSFPNGEVLARQMVELIHSCEKQFDHEADHCWRILHVAECFK  
SACVAHGIAPSMEMMMTEFIMESAR

>AIGOBP2

MTPKYCMLVVVVAAVASSVMA  
TQEVMSHVTAHFGKALEECREESGLSAEILEEFQHFWRDFEVVHRELGCAIICMSNKFSL  
LKDDSRMHVNMHDYVKGFPNGEVLARLVELIHNCEKQYDSLPPDCDRVVKVAACFK  
VDSKAAGIAPEVAMIEAVMEQY

>AIOBP1

MECNNEHPITPKEMLLLKANKIPESAKCFVACIFKRTGMLNSKGMYDAAASIALTEKDF  
ADDPKKLENSKKLLESCKNVNDEPVKDGEKGCERSVHLHKCIVDTAAQLGIKLPN

>AIOBP2

MFKYFIYCVFIVSASHA  
DLLSQKENKGATLKPLSVCCDIPELGDPKFLAKCSNPKLPGPCNDVQCVFEESGFLDRNT  
LNKEAYKAHLRKWEENKNGWTVAVDKAIADCVDNDPRQHLDVPCKAYDVFTCTGIAML  
KKCPEAAWKC

>AIOBP3

MTMKQIRNTGKMMRKSCQPKNNVEDEKIDPIADGVFIDEKEVKCYMACIMKMANTIKN  
GKINFDAAIKQADLLLPDEVKEPAKEAILACKKAADHKDICDASFHLTKCIYNQNP GIFYF  
P

>AIOBP4

MKSFVVFVAVAGIYA  
ADVPLPAAQKEKAKAISAEVKEGVS KAVLADALKGTLADDEGLKKFTLCFFHKAGIV  
DGQGALNIDVALAKLPPGVDKDNAKSVLEGCKSKTGKDTAEKVFEILKCYHMGVKNHV

LFAGI

>AIOBP5

MSKFTCLVLCLVAASISRVYA

GEEKAAFREAIIKPIIECSNDHGVSVEDIESAKAAGSADGIKPCFLGCVYKKAEVINSKGE  
YDVRTALSCLKTFVSDDAKYAKLAEVGKKCASVNEKAVSDGDAGCERGALLTACFLENK  
GEALI

>AIOBP6

MWFRTIVLVAALAAARA

VEMDEDMAELARMVRENCIAETGADVALVEAVNGGADLMPDDKLCYIKCTMETAGM  
MGDGEVDVEAVLALLPPELAARNGPALNACGTQRGADDCDTAWKTQVCWQSANKADY  
FLI

>AIOBP7

MIRSCSLVLAVLVQVLLGQA

QEPAPFPQFQDRIPRHCLAPPPGINLHTCCPIPNLYPDEVMESEKIEKVRQDNPAPPKPRG  
PPKAPCKEGICLMQHADLLLANQSVDYEKLRSFIDHWAESNPDFSEAILAAKEICAKDGGP  
SGPPVCEQDKIFFCLTSNILWNCKLRDLGNSGCSILKAHMDECRPHFLKRKELEEQNGQ

>AIOBP8

MYHLYISVVFVCCVFSISVKA

SSLDELKMKYVELILECSNSYPITRDDMSLLRRKIMPDSSEKCLFACVYKAGMMNEHG  
QLSVQGVNEMTRKYLADDPEKIKKSEFTQACESVNDVEVSDGERGCDRAALIFKCTVE  
KSPDFDLF

>AIOBP9

MKTLMVFAACILLAQA

LTDEQKEKLLKHRTECLTETKVDEQLVNLKGGDYKTESEPLKKYALCMLMKSELMTKD  
GKFKKDALAKVPNAADKPMVEKLIDACLANKGNTQPQTAWNYVKCYHEKDPKHAIFL

>AIOBP10

MKWLGDSSVDKAKLTTFFEQFEKDHAEWASAVQQVKTVCCLGSELKAQGVFLNCPVYDV  
MHCILGAFVKHATPSQWSTEASCSYARAYAADCPVCPN

>AIOBP11

MTDFACLILCAVVVNISIAYA

DESTRARQDEVSAFLRECAKEYGVEEQSIDQAAMSQDVTLVNSCFWACVLKKTGFLNDK  
GEYDMKTGMMYVKEVVPQESTYKNLEDVAKLCEAVKDKPVNDGEAGCERGAQVVDCF  
LKQMETQMKMAAHQK

>AIOBP12

MFRWELPVVLCFIAAALGGKEKPVFS

DEIKEIIQTVHDECVAKTGVAEEDITNCEKGIFKEDPKLKCYMFCLMEEASLVDDDDVVDY  
DMLVSLIPDEYYERTTKMIFSCKHLDTPDKEKCQRAFEVHKCSYEKDPDLYFLF

>AIOBP13

MVRQIGLLLCSLCVFGISLS

DSAISADSESRCPNPPTAPQKIERVITLCQDEIKLSILREALDVIKKEHTMPAQRRRDKREVP  
FTHDEKRIAGCLLQCVYRKVKAVDGYGFPTLEGLVGLYSDGVNERGYFMAVLEASRECL  
MKNHDKFSRTVPMDNGRNCDISFDIFECISDRIGEYCGTAGL

>AIOBP14

MFKFCAFLFWVASCYA

APGAGTYCGETPDVIYNCLSAPKLVSSSEISNKCTGAKYSNECDKLTFCVFREAKWLNDATV  
DKAKLTTYFEQFERDHAAWSPAIQHVKTACLGSELKPQGVNLNCPAYDIMHCALSSFIKH  
ATPSQWSTAASCTYPRAYATDCPVCPCNDCFSPQVPIGSCNACYLQPPAA

>AIOBP15

MFKSSAIFLCCLFFCALTPYLTYA  
MTAEQKAQIHAHFEAIGMSCNKDSTMITSEDIADLRAKKIPSGPNAPCFLACMMKQIGVM  
DESGMLQKETLLEMAKKIFDDAEELKIIEDYLHSCAHINGESVSDGAAGCDRAMLAYKC  
MTENASQFGIEV

>AIOBP16

MFVYGRLSFAAVLLCLGCTYA  
ITKEDEASLKQALHPHVMECAEEFGITPEQFEEAKKKNENAKHMDPCFLSCMMKKAFLD  
SDGKIDFEKTVSFAKDHELSEKAVKFFETVGECAKVNDDDEVSDGEKGCERAKLLFHCVH  
EIKKKMAE

>AIOBP17

MVDAVLLMLLPAAWACSG  
EGNIKLEDEVAVALKSCTYPDDTVVSKEPVSKERQRRGSDDTYDGSPRIDNNMKEGNRY  
SHERRNTNNSGDQIQVFNATDYDYEGYGTGSGEKLKLLTSVPRPASPSNNVNNNNTSRTRR  
SEPLLKQDLQCLSQCVFANLQVVDTRGIPREAELWNKVQSSVTSQQSRSALHYQIRAC  
FQELQSEAEDNGCSYSNKLEKCLMLRFSRDKVDGKASTQKPASTEQS

>AIOBP18

MSKFTCIVLCVVAASLVKVS  
VTEEEKAAFREAMAPVIAECSEEHGVSESDIQAAKEAMSADAIKSCFLGCVMMKTEAVDA  
KGMFDADAGLSKIRKYVNSDDDFAKFEKIGKLCMSVNDKEVSDGEAGCERAKLVLACFL  
EHKADIPF

>AIOBP19

MDDMGMISPEKARENAKKVFKGSDEHLKNVDKIMDTCSKVNQTTSDGNKGCDRAKL  
AFGCFTENAPKVSC

>AIOBP20

MVKMARLLLSMVLTTTVALTQS  
ASTSMKDAATKEAMSTTMADMGSIDTLDVNVLDVMSACNESFRIEQAYIQSMNETGSFI  
DETDKTPKCFIRCVFENVGIVSEDGKQFNPARAAVIFAGERNGKPMDDIGDMTAMCAADR  
QESCLCDRSYQFLRCLMSMEIEREKA

>AIOBP21

MFKSSVVYFAILAVFFKNALA  
ITDEKQKQIQTKVVAVGAECLKEYPLSDDLASFKSRVFPEGENAGCFSACIFNKLGLFDDK  
GTWSHVTALEHAKKVFDDDEVLKNIEAFLTTCAKVNEEEVKDGEKGCERAKLAFDCFK  
NYEQLGFNFDF

>AIOBP22

MVYSSNIFLFTVSLIFMLNSSYVSS  
MTREQIKNSGKLIKKTCSAKNGLTEDQVKDVKGKFIIEKNFMCYIACVYKMGQSIKGN  
TINHMMVRQVEMMFSEMKTVPVAAAIEHCRGVAKKYKDVCEASYWTAKCIYEFDPAN  
FMFP

>AIOBP23

MWNFIILFVAICSCVYG

LTEQELKVEFTKLIMKCNKDSEVDMMELVQLQSYVVPTKTATKCVLACAYKAANVMNA  
QGLYDIDHAYKVAEMMKNGDEKRVINGKKMADVCKVNDVKVSDGEKGCRAALIFK  
CTVDNAPKFGFKL

## CSP

>AICSP1

MKAVFLLCALVVVSA

RPEAQYTNKYDNVDLDEIIQNRLLVPYIKCGLDQGKCTPDGKELKSHIKEALETYCAKC  
TDVQRDGTTRRVIAHLINHEPEYWRELSAKYDRDGKFARKYEDELRTVA

>AICSP2

MKLLIILALVAAFA

RPDDAHYDSKYDNFVDDELIQNERLLKAYAHCIIGDGKCTPEGNEIKGWTPEAVQTSCGK  
CTEKQKVLVAKCIKAIREKLPEEFELLVKKNDPEGKHKEGLKSFLEKYA

>AICSP3

MNALLVAVFALVASSALA

YDEIYDKIDVDKILGDDALFSAYINCMLDKGDCSVEHSADFRKLLPEVIATSCAKCSPIQR  
QNVRKTVKALSEKRPDEFAEFRTKYDPKGEYEKSFTEFVMGTD

>AICSP4

MRAVLLMCVFVYAVVA

QDVNDMLNLPKYDSRYDYLDVDAIFTNKRLVRNYVDCLINAVRCTPEGKALKRILPEALR  
TKCVRCTERQQRTAVKVIKRLKNEYDPDEWAKLSSRDPTGDFTRYFEEFLAKENFNTIPGS  
GSAIPTSSPLVPPRVTTMPATVATPAPGPTEPAPAQPAIFNRFGDDDEVMMGSPSSAGMTPRP  
MTQATTRPTTTMRPTTTMRPITSKPLSPRPTMMTWGSAATNTQPTRFPLRPVAELPIPYSTA  
ITLIDQIGYKIIKTTELVTDLLKHTVRAVVGR

>AICSP5

LKTGCSKCTARQGGIKKVMGHLIKHEPEYWARAVDKYDPDRVYTKKYEQEVYSWQ

>AICSP6

MHSTIAMLLLVLTIQSNA

TETSTYTTKYDGIDLDEILNNDRLLTGYVNCLLDIGPCTADGKELKQNLPAIENDCKKCT  
EKQREGSERVMHYIIDNRPDDWVKLEDKYNTDGSYKLYLASKLTEADKETNVTTSEEN  
TKNVSKESSKE

>AICSP7

MKVLVLPVLVAFAAAAA

ELSPAELSMLEAFDYETLLANKELSQKLFDCMLEKGDCGEYKQVADLSMKTLQSKCAEC  
TPAQKAKYENVLKQLKEKYEPVYNELLKKAGATQKT

>AICSP8

MKVIVAIALLCIVAVAWG

KPAGTYTDKWDHINVDDEVLESQRLLKAYVDCLMDRGRCTPDGKALKETLPDALEHECSK  
CTEKQKTGSDKVIRHLVNRKRPDLWKELSTKYDPDNIYQERYKNKIEAVKQ

>AICSP9

MKFVLLLCVMVAAVLA

EDKYTDKYDNLNVDEILTNKRLLLEAYVNCVLEKGGKCTAEGKELKEHLQDAIETGCKKCT  
EAQEKGAKVIDYLIKNELGWRELTDKYDPTGTWRKTYEDRAKAAGIKIPE

>AICSP10

MNYLVLSVVVTLAAFVAA

ETYTDRYDHINIDEIIDNRKLLVPYIKCTLDQGRCTPEGRELKAHIKDAMQTSCSKCTPKQ  
RKAARKVVKHIRAKEQDYWKQIIAKYDPNDEYKENYETFLETTD

>AICSP11

MKTVLVLCLLIAAVYS

RPD TYDTRYDNFDVESLVENVRLKSYAHCFLSTGPCTPEGTAFFKKTIPDALQSGCSKCS  
RQRHLVRVVVKGFQSKTPDLWQQLVKKEDPNGEYKATFTKFINASD

>AICSP12

MKACIALCVLSVAVMALA

RPEDSQYTDRYDNVNLDEILSNRLLTPYVKCLLDQGGKCAPDAKELKEHIWEALENECGK  
CSEKQRKGTRRVISHLINNEEDYWNELTAKYDPERKFTAKYEKELKEINA

>AICSP13

MRNWLLCLCVLTVVVSCYS

QGNRYENFNDAIIQNDRILLAYKCVMDKGPCTRDGKNFKRVLPELATAACGRCNPKQ  
KTIVRLLLLGIRSKSEPRFLELLDKYSPDRSNRDALYTFVLTGN

>AICSP14

RTLAPLVLRGACPQCSMQETRQIRRTLAFVQRNYPWEWAKIVRQYG

>AICSP15

MRVLIVLSCMLVVAFA

AEKYNAKYDNFDVETLISNDRLLKAYINCFDKGRCTPEGSDFKKTLPEAIETTCAKCTEK  
QKGNIRKVIKAIQQKHPKEWDALVKKNDPSGKNRVNFDKFIQSS

>AICSP16

MIENKRSFRVSLIFTYIFLVTVLAQEKYYDRRYDYEIDSLIQNRLLKKYLD CFLGKGPCT  
PIGKVFQKILPEAVATAACKCSPSQRR LARKAFNAFDRFFPDYVEFVHKLDPKNKYYEAF  
ENAITNA

>AICSP17

MNSFIVLCLFGLVAVSLA

RPDSTYTNRYDNVNLNEILSNRLLVPYIKCILDQGGKCTPEGKELKSHIKEALEEDCAKCT  
PTQRDGTRQVMGHLINHETDYWNQLKAKYDPQSKYASKHEQELRTLKN

>AICSP18

MKCIYVLSLLLAFVAVQA

EDKYSTENDDLIDAVVADLDTLKGFLGCFMDTVTCPAVPADFKKDIPEAVKTNSKCTD  
AQKHIFHKFLLGLKEKLPSDYEAFFKKKFDPENKHFTALEAAVASF

>AICSP19

MKIVLVTLCALGVLA

EEQYGSANDDFDISEVLHNERLLQAYGRCLLDKGPCTAEVKTLKEKLPEALETRCAKCTE  
KQKQMGKALAEVKKNHDLWKELVAHYDPEGKYQEAWKEFLKE

>AICSP20

MQIKYALVLCVAATAVA

QTQRPAVSDTALEDALQDKRFIQRQLKCALGEAPCDPIGKRLKTLAPLVLRGACPQCTPQE  
TKQIQRTLSYVQRNFPQQWAKIVRQYAG