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Preparation of Chiral Phosphorus, Sulfur and Selenium Containing 2-Aryloxazolines

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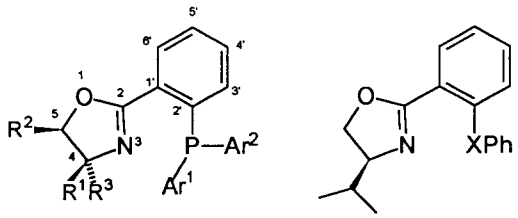
Abstract: A series of enantiomerically pure 2-[2-(diarylphosphino)aryl]-oxazolines was prepared from commercially available or synthetic amino alcohols. For oxazoline formation three procedures were employed: (*i*) one pot condensation with a 2-halobenzoic acid, (*ii*) $ZnCl_2$ catalyzed condensation with a 2-halobenzonitrile, and (*iii*) a three step sequence *via* a 2-halobenzamide and a tosylate or chloride. Phosphinooxazolines containing stereogenic phosphorus were prepared by either diastereoselective nucleophilic substitution of halogenide of Ar^1Ar^2PCl or by nucleophilic aromatic substitution with $LiPAr^1Ar^2$. In addition, sulfur and selenium analogs were prepared.

Subsequent to pioneering work of Meyers and Brunner,[1] oxazolines, readily available from amino acids, have found widespread use as chiral nonracemic ligands in asymmetric catalysis.[2,3] Recently, we[4] and others[5] developed phosphinoaryloxazolines **1** and **2** as new classes of ligands containing a soft and a hard donor center. These were found to be highly effective, with respect to reactivity and enantioselectivity, in Pd and Rh catalyzed reactions (allylic alkylation and amination,[3] Heck reaction[6] and hydrosilylation[7]). In addition to phosphines **1** and **2** corresponding sulfur and selenium derivatives, **3** and **4**, respectively, were prepared which showed promising degrees of enantioselection in allylic alkylations.[2,8] In this article we report the preparation of the new oxazolines.



1 $Ar^1 = Ar^2$
2 $Ar^1 \neq Ar^2$

3 X = S
4 X = Se

Synthesis of the oxazolines **1-4** involves preparation of a 2-(2-halophenyl)-oxazoline and then formation of the P, S, or Se derivatives by substitution. The starting materials are amino alcohols derived from α-amino acids that are available in great variety and high enantiomeric purity from the chiral pool. In addition, numerous non-racemic chiral amino alcohols are in use as intermediates in the

pharmaceutical industry. Thus, a high degree of variability, important in asymmetric catalysis, with respect to the oxazoline moiety is given. Similarly, the soft donor groups and their substituents, especially interesting for phosphorus, can be varied widely. We have been particularly interested in compounds with stereogenic phosphorus, *i.e.*, compounds of class **2** and compounds with a functionalized oxazoline side chain, *i.e.*, R^1 or R^3 of **1** or **2** containing OH, NR_2, SR and other groups with coordination ability or hydrogen bonding capacity. These were prepared by substitution reactions involving phosphorus as nucleophilic or electrophilic key atom. It was of interest to study in this project diastereoselectivities of these reactions.

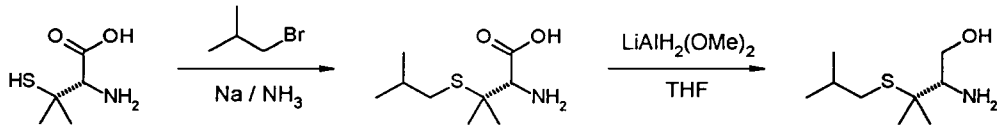
PREPARATION OF 2-(2-HALOPHENYL)-OXAZOLINES

Amino Alcohols

Most of the requisite amino alcohols **5** (see below) were prepared from α-amino acids by reduction with $LiAlH_2(OCH_3)_2$ according to a modified method of Saund and Mathur.[9] The following modifications are essential to reliably get a pure product in very high yield: (a) the reaction must be run in an inert atmosphere as otherwise colored impurities are formed; (b) work-up of the reaction mixture by addition of small amounts of water and 15 % NaOH according to a prescript published by Mihailovic[10] which leads to a precipitate of alumina with very little adsorption capacity that can be filtered off. Almost pure amino alcohols are obtained after evaporation of the solvent. This method is vastly superior to the conventional reduction/work-up with $LiAlH_4$. For example, in the preparation of phenylglycinol the conventional method[11] gave 60 % yield after extensive purification. The much simpler new procedure gives a yield of 91 %.

Catalysts or auxiliaries derived from *t*-leucine often induce particularly high selectivity. Unfortunately, this amino acid is expensive. As an analog with an even more bulky substituent we have used the readily available amino acid D-penicillamine as the precursor of oxazoline *ent*-**6l**. D-penicillamine was transformed into the S-isobutyl derivative[12] and this reduced to the amino alcohol *ent*-**5l** (Scheme 1) in 79 % overall yield.

Scheme 1



D-penicillamine *ent*-**5l**

Scheme 2

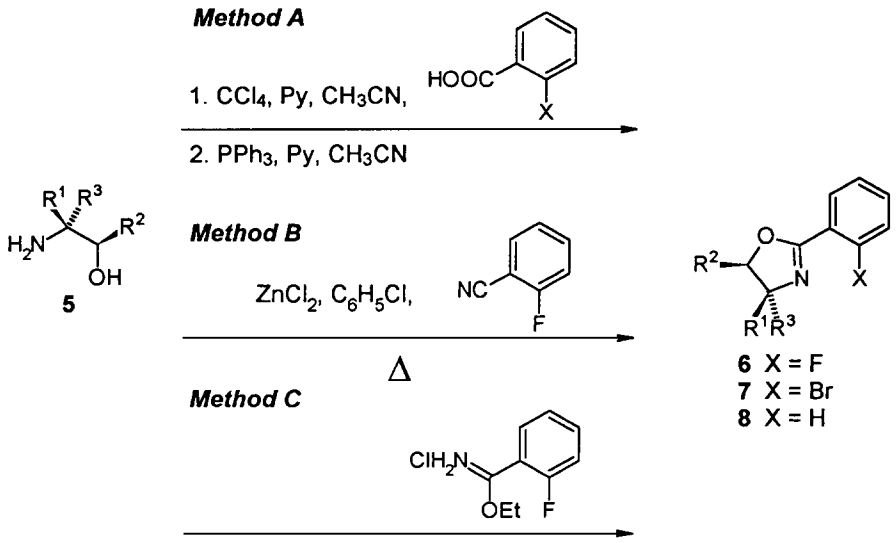
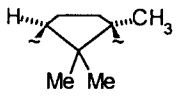


Table 1. Preparation of Halophenyloxazolines According to Scheme 2 (R^3 = H).

Entry	Amino Alcohol	R^1	R^2	Method	Product	Yield [%]
1	**5a**	H	H	A	**6a**	34
2	**5b**	*i*Pr	H	A	**6b**	92
3	**5b**	*i*Pr	H	A	**7b**	69
4	*ent*-**5c**	Ph	H	A	*ent*-**6c**	48
5	*ent*-**5c**	Ph	H	B	*ent*-**6c**	23
6	**5d**	CH_2Ph	H	A	**6d**	58
7	**5e**	*t*Bu	H	A	**6e**	34[a]
8	**5f**	CH_2-3-indolyl	H	A	**6f**	40
9	**5g**	$(CH_2)_2SMe$	H	A	**6g**	37
10	*ent*-**5h**			C	*ent*-**6h**	45

[a] In addition, 16 % of the aziridine **11** was isolated.

2-(2-Halophenyl)-oxazolines

The halophenyloxazolines are available from enantiomerically enriched or pure amino alcohols via several routes.[13] We have mostly relied on (a) one-pot condensation of the 2-halobenzoic acid with the amino alcohol according to a procedure developed by Vorbrüggen[14] (Scheme 2, Method A), (b) one-pot reaction of the amino alcohol with the 2-halobenzonitrile under catalysis with $ZnCl_2$ according to Witte[15] (method B) or condensation with an imidate (method C) (c) a three step synthesis (Scheme 3) involving formation of an amide, transformation of the OH group into a leaving group [Cl (method D) or OTs[16] (method E)] and ring closure.

Scheme 3

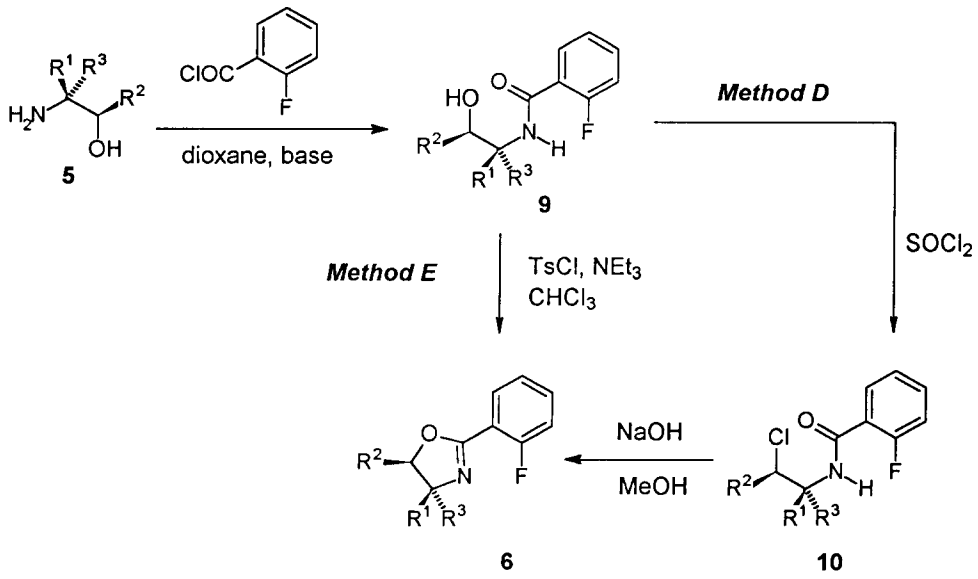
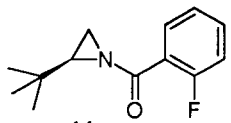


Table 2. Preparation of Fluorophenyloxazolines via Amides According to Scheme 3 (R^2 = H).

Entry	Amino Alcohol	R^1	R^3		Yield [%]	Method		Yield [%]	Product	Yield [%]
1	**5i**	Me	Me	**9i**	95	D	**10i**	98	**6i**	98
2	**5j**	Me	H	**9j**	96	D	**10j**	99	**6j**	96
3	*ent*-**5c**	Ph	H	*ent*-**9c**	77	D	*ent*-**10c**	>99	*ent*-**6c**	95
4	**5e**	*t*Bu	H	**9e**	>99	E	-	-	**6e**	98
5	*ent*-**5k**	(*S*)-CH(OH)Ph	H	*ent*-**9k**	>99	E	-	-	*ent*-**6k**	75
6	*ent*-**5l**	$C(Me)_2SiBu$	H	*ent*-**9l**	>99	E	-	-	*ent*-**6l**	84

The Vorbrüggen method (A) is often very convenient. Unfortunately, bulky and highly functionalized amino alcohols gave poor yields caused by difficulty in removing triphenylphosphine oxide (by extraction with diethyl ether) and side reactions which normally were not investigated. Only in the case of *t*-leucinol (**5e**) the aziridine **11** was isolated in 16 % yield in addition to the oxazoline. Obviously, this compound results from a nucleophilic substitution by the amide nitrogen of an intermediate with activated OH group. One step methods B and C were only rarely applied by us (cf. Table 1, entries 5 and 10, respectively) and gave yields below 50 %. Method B was extensively applied by Williams and co-workers.[8] Recently, Pfaltz and co-workers developed a modified procedure with improved yields.[17]



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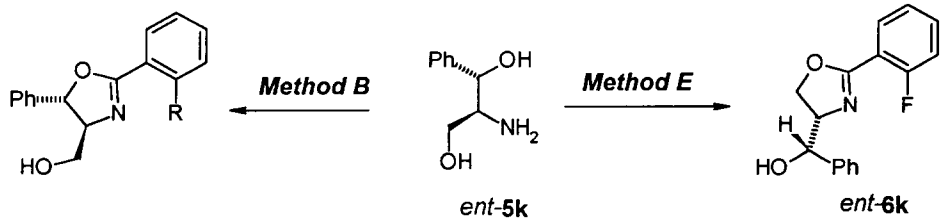
In spite of more steps methods D and E generally gave superior results. Each step proceeds with good or excellent yield (in general > 80 %). In the tosylation step excess triethylamine (5 equiv) was employed which caused *in situ* ring closure. Overall yields are typically 70 - >90 %. For comparison, with phenyl glycinol methods A, B and D gave yields of 48, 23 and 72 %, respectively. Formation of aziridines was not observed for the ring closure step as reported for similar reactions by Denmark and co-workers.[18]

An interesting case is the amino alcohol *ent*-**5k** (Scheme 4) which had previously been transformed according to method B, *i.e.*, *via* activation of the amide, into bisoxazolines[19] and even into a (diphenylphosphino-phenyl)-oxazoline[20] containing a 4,5-disubstituted oxazoline moiety as displayed in Scheme 4. In contrast, method E proceeds via activation of the primary OH group by formation of the tosylate and thus gives rise to the alternative oxazoline moiety of ent-**6k**.

Scheme 4

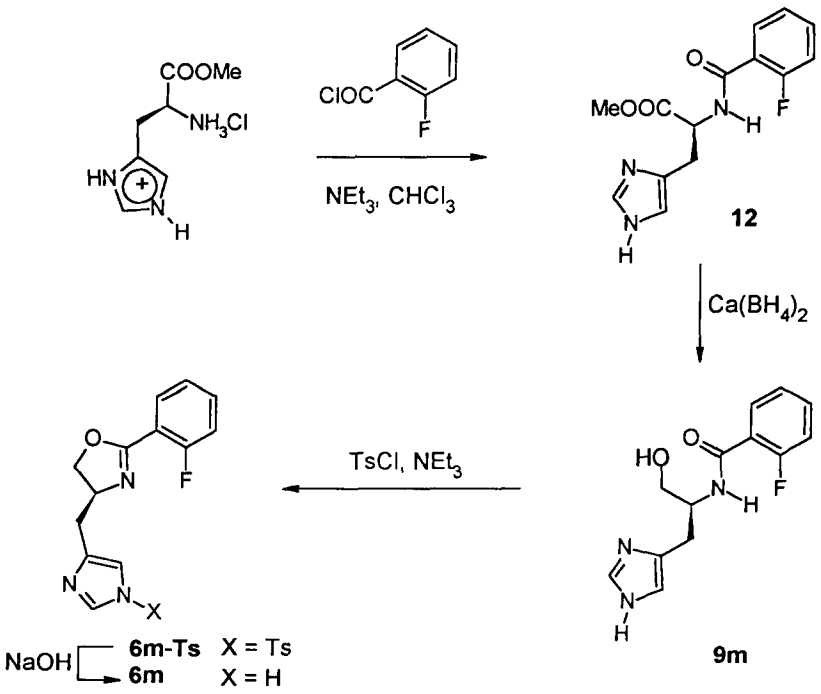


ent-**5k** *ent*-**6k**

Oxazoline **6m** was synthesized (Scheme 5) by the multistep method via the amide **9m.** This was prepared by reaction of L-histidine methyl ester hydrochloride[21] with 2-fluoro-benzoyl chloride to yield

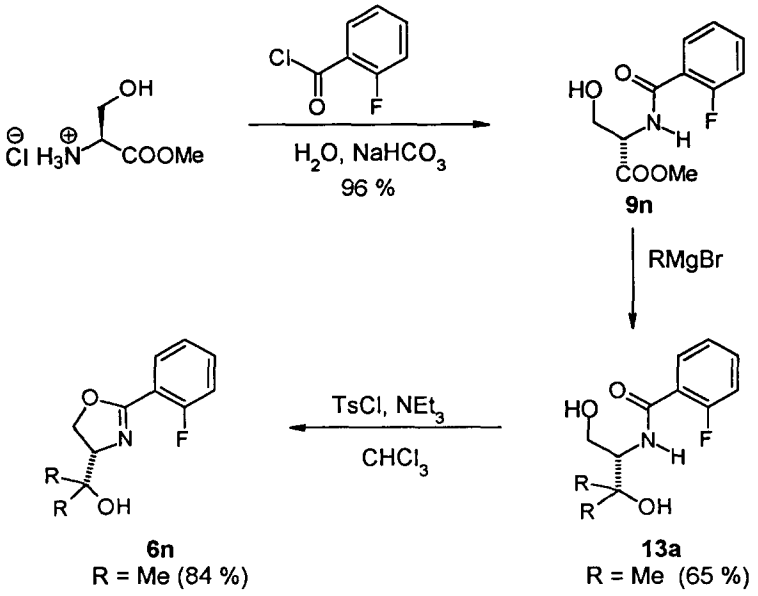
the ester amide **12** (78 %) and selective reduction of the ester group with $Ca(BH_4)_2$ to give **9m** (92 %). Ring closure via a tosylate (method E) did not yield **6m** directly, but gave the tosylate **6m-ts** (64 %) which was converted to **6m** by treatment with sodium hydroxide (65 %).

Scheme 5



The amino acid L-serine offers access to a variety of functionalized oxazoline ligands. L-Serine was converted to the methyl ester (92 %) by treatment with thionyl chloride in methanol at -20 °C.[22] Reaction of the ester with *o*-fluorobenzoyl chloride gave amide **9n** (96 %). This can be reacted with Grignard reagents to yield tertiary alcohols **13** in good yields and thus opens the way to easy modification of the oxazoline moiety. Thus far, compound **13a** has been prepared as the first example. Reaction with tosyl chloride/base is favored at the primary OH group and thus generates the oxazolines **6n** with a bulky substituent. Note that the configuration of the stereogenic center of the oxazoline moiety is the reverse of that obtained from L-amino acids because the oxazoline substituent is derived from the carboxyl group rather than the side chain of the amino acid.

Scheme 6



PREPARATION OF 2-(2-DIARYLPHOSPHINOPHENYL)-OXAZOLINES WITH NONSTEREOGENIC PHOSPHORUS

For the preparation of ligands **1** from the halogen derivatives **6** or **7** the introduction of the phosphino group by nucleophilic as well as electrophilic phosphorus compounds was investigated[23] (cf. Scheme 7, methods F and G, respectively).

Nucleophilic substitution by treatment of fluoride **6** with $LiPPh_2$ gave superior results, as was independently established by Williams and co-workers[24]. Results displayed in Table 3 demonstrate that, excepting **1f**, yields in the range of ca. 40 - 89 % were achieved. In the case of compound **1d** nucleophilic substitution of bromide was attempted by treatment of **7b** with $LiPPh_2$; this only gave a yield of 17 % and mainly led to the phenyl derivative **8**, probably *via* metal halogen exchange to give the o-lithiophenyl derivative and protonation of this upon work-up.

In addition to the diphenylphosphino derivatives other diarylphosphines were prepared in order to assess the influence of the steric and electronic properties of the phosphino group. Starting from **6b**, the four derivatives **1n-1q** were prepared. In case of the *m*-xylyl (**1p**) and *m*-tolyl (**1q**) derivatives, the yields were moderate (30-40 %). The required diarylphosphines Ar_2PH (Ar = Ph, *m*-tolyl, *m*-xylyl) were prepared by treatment of the corresponding triarylphosphines with lithium metal.[25]

Scheme 7

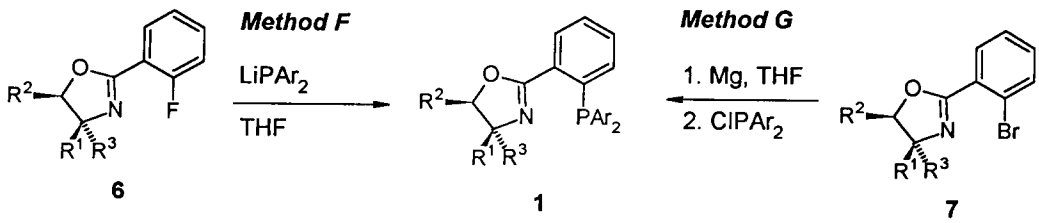
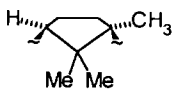
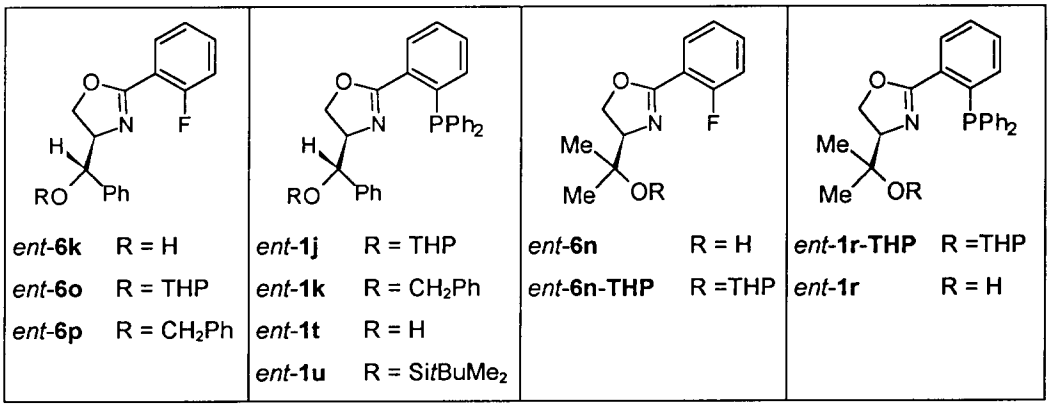


Table 3. Preparation of Phosphinooxazolines According to Scheme 7.

Starting material	R^1	R^2	R^3	Method	Product	Ar	Yield [%]
6a	H	H	H	F	**1a**	Ph	83
6i	Me	H	Me	F	**1b**	Ph	41
6j	Me	H	H	F	**1c**	Ph	76
6b	*i*Pr	H	H	F	**1d**	Ph	67
7b	*i*Pr	H	H	G	**1d**	Ph	30
ent-**6c**	Ph	H	H	F	*ent*-**1e**	Ph	65
6d	CH_2Ph	H	H	F	**1f**	Ph	22
6e	*t*Bu	H	H	F	**1g**	Ph	56
6m	CH_2-imidazole	H	H	F	**1h**	Ph	47
6f	CH_2-3-indolyl	H	H	F	**1i**	Ph	85
ent-**6o**	(S)-CH(OTHP)Ph	H	H	F	*ent*-**1j**	Ph	76
ent-**6p**	(S)-CH(OBn)Ph	H	H	F	*ent*-**1k**	Ph	89
6g	$(CH_2)_2SMe$	H	H	F	**1l**	Ph	77
ent-**6l**	CMe_2S*i*Bu	H	H	F	*ent*-**1m**	Ph	60
6b	*i*Pr	H	H	F	**1n**	1-naphthyl	65
6b	*i*Pr	H	H	F	**1o**	biphenyl-2,2'-diyl	41
6b	*i*Pr	H	H	F	**1p**	3-xylyl	45
6b	*i*Pr	H	H	F	**1q**	3-tolyl	45
ent-**6n-THP**	CMe_2OTHP	H	H	F	*ent*-**1r-THP**	Ph	41
ent-**6h**			H	F	*ent*-**1s**	Ph	73

The (diphenylphosphino)-phenyloxazolines *ent*-**1k** and *ent*-**1r** with an OH group in the oxazoline side chain were of interest in view of excellent results obtained by Ito, Hayashi and their co-workers[26] with hydroxylated aminophosphines derived from ferrocene. The OH function had to be protected before the phosphorus center could be introduced. The oxazoline *ent*-**6k**, prepared from (+)(1*S*,2*S*)-2-amino-1-phenyl-1,3-propandiol (cf. Table 2, entry 5), was protected as THP or benzyl ether *ent*-**6o** or *ent*-**6p**, respectively, by standard procedures (*ent*-**6o**: dihydropyran, pTsOH, CH_2Cl_2; *ent*-**6p**: NaH, benzyl bromide, THF). Nucleophilic substitution with $LiPPh_2$ gave the ligands *ent*-**1j** and *ent*-**1k** from which the ligand *ent*-**1t** with an OH group in the side chain was prepared by deprotection. Reaction with *t*$BuMe_2SiOTf$ and base gave the silyl derivative *ent*-**1u**. Similarly, preparation of the phosphinooxazoline *ent*-**1r** commenced with protection of the OH group of *ent*-**6n** with dihydropyran to furnish 90 % of *ent*-**6n-THP**. Subsequent nucleophilic substitution with $LiPPh_2$ gave *ent*-**1r-THP** (41%) and deprotection (90 %) yielded ligand *ent*-**1r** in excellent overall yield.



ent-**6k**	R = H	*ent*-**1j**	R = THP	*ent*-**6n**	R = H	*ent*-**1r-THP**	R =THP
ent-**6o**	R = THP	*ent*-**1k**	R = CH_2Ph	*ent*-**6n-THP**	R =THP	*ent*-**1r**	R = H
ent-**6p**	R = CH_2Ph	*ent*-**1t**	R = H				
		ent-**1u**	R = Si*t*$BuMe_2$				

When electrophilic phosphorus (method G) was employed, oxazoline **7b** was converted to an organomagnesium derivative by reaction with activated magnesium[27] followed by treatment with chlorodiphenylphosphine to give the phosphinooxazoline **1d** in modest yield. Pfaltz and co-workers have similarly employed the o-lithiophenyloxazoline prepared by metallation of **8** (Scheme 2) with n-butyl lithium[5a,17].

PREPARATION OF PHOSPHINOARYLOXAZOLINES WITH STEREOGENIC PHOSPHORUS

The ligands containing stereogenic phosphorus were prepared analogously to the ligands described above. The reactions of unsymmetrically substituted phosphorus compounds with the fluorides **6** or

the Grignard reagents derived from bromide **7** proceeded with reasonable yields and with fairly high diastereoselectivity (Scheme 8 and Table 4). The diastereomers showed characteristic differences in their ^{1}H, ^{13}C and ^{31}P NMR chemical shifts (cf. Table 5) which allowed the diastereomer ratios (d.r.) to be determined.

Scheme 8

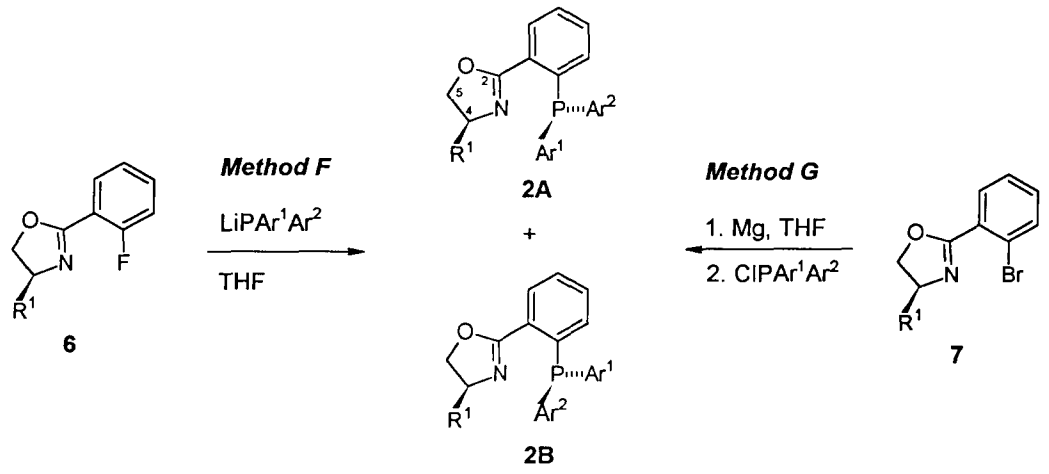


Table 4. Preparation of Phosphinooxazolines with Stereogenic Phosphorus According to Scheme 8.

No.	6/7	R^1	Method	Product	Ar^1 a	Ar^2	Yield [%]	d.r. b	Configur. major diast.
1	**6j**	Me	F	**2aA/2aB**	2-Bp	Ph	46	25 : 75	S_CR_P (*u*)
2	**6b**	*i*Pr	F	**2bA/2bB**	2-Bp	Ph	66	22 : 78	S_CR_P (*u*)
3	**6b**	*i*Pr	F	**2cA/2cB**	1-Np	Ph	67	38 : 62	S_CR_P (*u*)
4	**7b**	*i*Pr	G	**2cA/2cB**	1-Np	Ph	30	0 : 100	S_CR_P (*u*)
5	**7b**	*i*Pr	G	**2dA/2dB**	2-Bp	3,5-$(CF_3)_2C_6H_3$	47	13 : 87	c
6	**6e**	*t*Bu	F	**2eA/2eB**	2-Bp	Ph	60	33 : 67	S_CR_P (*u*)
7	*ent*-**6c**	Ph	F	*ent*-**2fA**/*ent*-**2fB**	2-Bp	Ph	66	22 : 78	R_CS_P (*u*)

[a] 2-Bp: 2-biphenylyl, 1-Np: 1-naphthyl. [b] d.r.: diastereomer ratio. [c] Relative configuration unknown.

All diastereomers were separable by LC (flash chromatography). The pure diastereomer **2cB** could be obtained by crystallization. Epimerization of the stereogenic P became noticeable at temperatures >80 °C and was rapid at 150 °C. The configuration of the phosphorus center could be assigned for **2cB** by X-ray analysis of a 1,3-diphenylallyl palladium complex.[2] For **2bA** and *ent*-**2fA** cyclohexenyl palladium complexes were obtained and their crystal structure determined. In other cases, the configuration of the phosphorus center was tentatively assigned by analogy based on chromatographic elution order, relative chemical shifts and the degree of diastereoselection in the preparation.

Table 5. Selected NMR Data of Phosphinooxazolines **2**.

	^{1}H NMR[a]		^{13}C NMR[b]			^{31}P NMR[c]
Ligand	4-H	5-H	C-2	C-4	C-5	
2aA	4.09-4.23 (m)	4.09-4.23(m)	163.12	61.99	73.63	-11.3
2aB	4.05 (m)	3.49, 4.18 (dd)	163.65	61.89	73.84	-11.7
2bA	4.09 (ddd)	3.89-4.03 (m)	162.87	72.94	69.84	-12.9
2bB	4.05 (ddd)	3.72-3.84 (m)	163.71	72.63	69.95	-14.4
2cA	3.77-4.10 (m)	3.77-4.10 (m)	162.95	73.09	70.01	-17.3[d]
2cB	3.73-4.16 (m)	3.73-4.16 (m)	163.17	73.09	70.10	-17.4[d]
2dA	4.26 (ddd)	3.97-4.10 (m)	161.97	73.40	70.18	-10.3
2dB	4.18 (m)	3.86-3.96 (m)	162.28	73.07	69.88	-10.9
2eA	3.93 (dd)	4.02, 4.06 (dd)	162.67	76.80	68.40	-13.3
2eB	3.78 (dd)	3.88, 3.69 (dd)	163.72	76.18	66.56	-13.9
ent-**2fA**	4.55 (dd)	3.95, 5.28 (dd)	163.87	70.35	74.31	-12.1
ent-**2fB**	4.50 (dd)	3.88, 5.13 (dd)	164.95	70.20	74.65	-11.9

[a] 300.13 MHz, $CDCl_3$, [b] 75.47 MHz, $CDCl_3$ [c] 36.19 MHz, $CDCl_3$, [d] 81.02 MHz, $CDCl_3$.

The requisite diarylphosphines were prepared according to some generally applicable procedures (equations 1-3). The most convenient preparation involved reaction of a aryldichlorophosphine with one equiv of a Grignard compound followed by reduction of the resultant Ar^1Ar^2PCl with LAH (equation 1). This procedure gave the phosphine (2-biphenylyl)PhPH in 71 % yield from the commercially available $PhPCl_2$.

$$Ar^1PCl_2 \xrightarrow[2.\ LiAlH_4]{1.\ BrMgAr^2} Ar^1Ar^2PH \qquad (1)$$

Ar^1 = 2-biphenylyl
Ar^2 = Ph

A similar procedure was employed with the naphthyl derivative. However, in order to entirely avoid formation of mixtures, the diethylamino group was used as protecting group followed by deprotection with HCl according to equation 2.[28] The phosphine (1-naphthyl)PhPH was obtained in 34 % overall yield.

$$Ar^1PCl_2 \xrightarrow{HNEt_2} Ar^1PCl(NEt_2) \xrightarrow[3.\ LiAlH_4]{1.\ BrMgAr^2,\ 2.\ HCl(g)} Ar^1Ar^2PH \qquad (2)$$

Ar^1 = 1-naphtyl
Ar^2 = Ph

Finally, the most general procedure (equation 3) was employed when the requisite arylphosphorus halides were not commercially available. Thus, dichloro-(diethylamino)-phosphine[29] was sequentially reacted with two different Grignard reagents followed by treatment with HCl and reduction. The phosphine (2-biphenylyl)-[3,5-$(CF_3)_2C_6H_3$]PH was obtained in 29 % overall yield.

$$PCl_3 \xrightarrow{HNEt_2} Et_2NPCl_2 \xrightarrow{BrMgAr^1} Et_2NPClAr^1 \xrightarrow[3.\ LiAlH_4]{1.\ BrMgAr^2,\ 2.\ HCl(g)} Ar^1Ar^2PH \qquad (3)$$

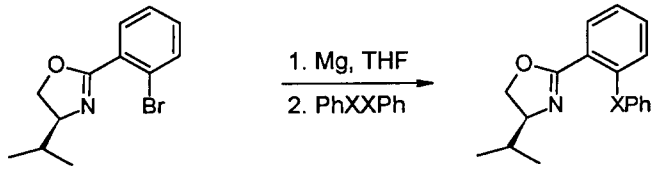
Ar^1 = 2-biphenylyl
Ar^2 = 3,5-$(CF_3)_2$-C_6H_4

ARYLOXAZOLINES WITH SULFUR AND SELENIUM AS SOFT DONOR CENTER

In order to replace the phosphorus center by other atoms exhibiting π-acceptor capacity, the compounds **3** and **4** were synthesized. The thio- and selenoaryloxazolines were prepared in good yields by converting **7b** to the corresponding Grignard reagent, followed by reaction with diphenyldisulfide (64 %) and diphenyldiselenide (85 %), respectively. Due to incomplete conversion of the Grignard

reagent, small amounts of compound **8** were obtained as a side product which could easily be separated by distillation (in the case of **3**) or column chromatography (in the case of **4**). Reaction of the fluoride **6b** with sodium thiophenolate was also successful but produced the desired **3** in lower yields (26 %).

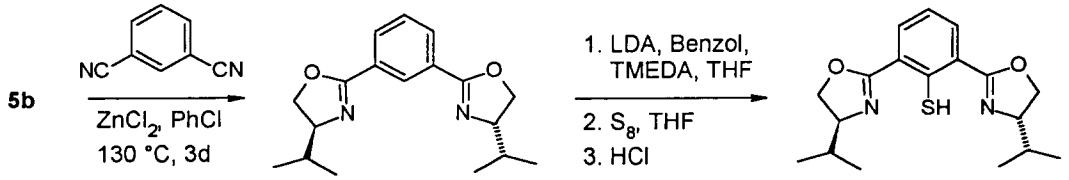
Scheme 9



7b **3** X = S, **4** X = Se

The C_2-symmetric thioloxazoline **15** is of interest in conjunction with enantioselective conjugate additions of cuprates to enones[30] which were already investigated by Pfaltz[31] with the corresponding monooxazoline.

Scheme 10



14 **15**

The bisoxazoline **14** was prepared according to Bolm et al.[32] from 1,3-dicyanobenzene *via* method B. Ortho-lithiation of **14** according to a modified procedure of Boekelheide et al.[33] and subsequent addition of elemental sulfur furnished the thiol **15** in 50 % yield. An important detail for the second step was the 1:1 dilution of the reaction mixture with THF before addition of sulfur. The THF dissolves insoluble aggregates formed by the previous lithiation. Furthermore, the conversion of **14** to **15** was highly sensitive to oxidation and the reaction and work-up including flash chromatography must be performed under an inert atmosphere. However, the pure ligand **15** is only slightly sensitive towards oxidation and can be stored under nitrogen without decomposition for several weeks.

EXPERIMENTAL SECTION

Methods. If not stated otherwise, ^{1}H and ^{13}C NMR spectra were recorded on a Bruker WH-300 [300 MHz (^{1}H), 75.46 MHz (^{13}C), $CDCl_3$] and ^{31}P NMR spectra on a Bruker AC-200 (81.02 MHz, $CDCl_3$) spectrometer (for numbering of atoms see formula **1**). For TLC Macherey-Nagel Polygram Sil G/UV_{254} plates were used with spot detection by I_2 vapour, UV light or phosphomolybdic acid in ethanol followed by heating. For flash chromatography ICN Kieselgel S (0.032 - 0.063 mm) was used, if not stated otherwise. For MPLC columns of type C (N = 10000) according to Helmchen and Glatz[34] were used. Melting points were determined in open glass capillaries and are not corrected. Optical rotations were measured on a *Perkin Elmer* 241 MC. High resolution mass spectra were recorded on a Varian MAT 711 in the Deutsches Krebsforschungszentrum (Dr. Hull).

Materials. Commercially available reagents were used without further purification. D-penicillamine was purchased from Fluka, 2-fluoro-benzonitrile, 2-fluoro-benzoic acid, 2-fluoro-benzoyl chloride and (+)-(1S,2S)-2-amino-1-phenyl-1,3-propandiol from Aldrich, *n*-BuLi from Chemetall, L-serine from Merck Darmstadt. *t*-Leucine and L-valine were obtained from DEGUSSA. Petroleum ether (PE) was distilled through a 1 m Vigreux column before use. Ethyl acetate was purchased from Merck Darmstadt and was distilled through a 1 m Vigreux column before use. Anhydrous diethyl ether, dioxane and THF were distilled from sodium/benzophenone or from CaH_2. Methylene chloride and chloroform were distilled from CaH_2. All anhydrous solvents were stored under nitrogen over 4Å molecular sieves. (*R*)-2-Amino-3-isobutylsulfanyl-3-methyl-butyric acid was prepared according to a prescript of Asinger and co-workers.[12] Di-(1-napthyl)-phosphine and tris-(3,5-dimethyl-phenyl)-phosphine were kindly provided by the group of Prof. G. Huttner, Heidelberg.

(-)-(***R***)**-2-Amino-3-isobutylsulfanyl-3-methylbutanol** (*ent*-**5l**). **General Procedure I.** To a suspension of 4.00 g (105 mmol) of $LiAlH_4$ in 70 mL of dry THF were added dropwise 6.70 g of dry methanol. Subsequently, 2.05 g (10 mmol) of (*R*)-2-amino 3-isobutylsulfanyl-3-methyl-butyric acid were added in several portions. The reaction mixture was kept at reflux for 3 h, then cooled to rt. Work-up was carried out by adding 4 g of H_2O, 4 g of a 3.75 N aqueous NaOH solution and 12 g of H_2O[10]. The solution was stirred for an additional hour, filtered and the residue was carefully washed with ether. The filtrate was dried over Na_2SO_4 and the solvent removed *in vacuo*. kugelrohr distillation of the residue (115 - 120 °C/0.02 mmHg) gave 1.51 g (79 % over 2 steps) of a colorless oil. $[\alpha]_D^{20}$ = - 10.2 (c = 2.10, $CHCl_3$). ^{1}H NMR: δ = 0.94, 0.95 (2s, 6H, 2 CH_3), 1.21, 1.29 [2s, 6H, $SC(CH_3)_2$], 1.71 [septet, *J* = 6.7 Hz, 1H, $CH(CH_3)_2$], 2.32 (d and bs, *J* = 7.0 Hz, 5H, SCH_2; OH, NH_2, H/D-exchange), 2.75 (dd, *J* = 9.0 Hz, 3.8 Hz, 1H, $CHNH_2$), 3.35 (dd, *J* = 10.6 Hz, 9.0 Hz, 1H, $HOCH_AH_B$), 3.75, (dd, *J* = 10.6 Hz, 3.8 Hz, 1H, $HOCH_AH_B$). ^{13}C NMR: δ = 22.3 (2q, 2 CH_3), 24.5 (q, CH_3), 26.3 (q, CH_3), 28.9 [d, $CH(CH_3)_2$], 36.4 (t, SCH_2), 48.4 [s, $SC(CH_3)_2$], 60.0 (d, $CHNH_2$), 62.4 (t, OCH_2). HRMS Calcd for $C_9H_{22}NOS$: 192.1422. Found: 192.1415.

Preparation of 2-(2-Halophenyl)-oxazolines

2-(2-Fluoro-phenyl)-4,5-dihydro-oxazole (**6a**). **General Procedure II (Method A).** At rt, a solution of 31.5 g (120 mmol) of triphenylphosphine in 50 mL of dry pyridine/acetonitrile 1:1 was added at rt within 4 h to a solution of 2.44 g (40 mmol) of **5a**, 18.5 g (120 mmol) of CCl_4, 12.2 g (120 mmol) of triethylamine and 5.60 g (40 mmol) of 2-fluorobenzoic acid in 55 mL of dry pyridine/acetonitrile 1:1. After stirring for 24 h, the solvent was removed *in vacuo* and the residue was three times extracted with ether. The combined organic layers were washed twice with sat. $CuSO_4$ solution, once with

brine and dried over $MgSO_4$. After filtration, the solvent was removed *in vacuo*. The residue was flash filtered (250 g silica gel, PE/ethyl acetate 85:15 - 50:50). The resulting oil was purified by kugelrohr distillation (150 °C, 19 mbar) to yield 2.25 g (34 %) of **6a** as a colorless oil. ^{1}H NMR: δ = 4.06 - 4.13 (t, J = 9.0 Hz, 2H, NCH_2), 4.37 - 4.44 (t, J = 9 Hz, 2H, OCH_2), 7.10 - 7.20 (m, 2H, Ar-H), 7.40 - 7.47 (m, 1H, Ar-H), 7.83 - 7.89 (m, 1H, Ar-H). ^{13}C NMR δ = 55.25 (t, CH_2N), 67.14 (t, OCH_2), 116.06 (d, $J_{C,F}$ = 10.2 Hz, C-1'), 116.66 (d, $J_{C,F}$ = 22.0 Hz, C-3'), 123.93 (d, $J_{C,F}$ = 4.0 Hz, C-Ar), 131.03 (d, $J_{C,F}$ = 1.7 Hz, C-5'), 132.80 (d, $J_{C,F}$ = 8.5 Hz, C-Ar), 161.19 (d, $J_{C,F}$ = 257.8 Hz, C-F), 161.29 (d, $J_{C,F}$ = 5.7 Hz, C=N). Anal. Calcd for C_9H_8FNO (165.17): C, 65.45; H, 4.88; N, 8.48. Found: C, 65.29; H, 5.01; N, 8.43.

(-)-(*S*)-2-(2-Fluoro-phenyl)-4-isopropyl-4,5-dihydro-oxazole (6b). According to general procedure II: 92 % yield; colorless oil (kugelrohr distillation: 0.03 mbar, 125 - 130 °C). $[\alpha]_D^{20}$ = - 74.8 (CH_2Cl_2, c = 2.37). ^{1}H NMR: δ = 0.92, 1.02 [2d, J = 6.8 Hz, 6H, $CH(CH_3)_2$], 1.89 [dqq, J = 6.4 Hz, 1H,$CH(CH_3)_2$], 4.09 - 4.17, 4.34 - 4.42 (2m, 2H and 1H, CHN, OCH_2), 7.11 (dd, J = 10.9 Hz, 8.3 Hz, 1H, Ar-H), 7.15 (dd, J = 8.5 Hz, 1H, Ar-H), 7.41 (m, 1H, Ar-H), 7.86 (ddd, J = 7.5 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 17.97, 18.88 [2q, $CH(CH_3)_2$], 32.69 [d, $CH(CH_3)_2$], 69.78 (t, OCH_2), 72.67 (d, CHN), 116.31 (s, C-1'), 116.62 (d, $J_{C,F}$ = 22 Hz, C-Ar),123.89 (d, J_{C-F} = 4 Hz, C-Ar), 131.20 (d, J_{C-F} = 2 Hz, C-Ar), 132.68 (d, J_{C-F} = 9 Hz, C-Ar), 160.27 (d, $J_{C,F}$ = 5 Hz, C=N), 161.15 (d, $J_{C,F}$ = 257.3 Hz, C-2'). Anal. Calcd for $C_{12}H_{14}FNO$ (207.25): C, 69.55; H, 6.81; N, 6.76. Found: C, 69.41; H, 6.89; N, 6.87.

(-)-(*S*)-2-(2-Bromo-phenyl)-4-isopropyl-4,5-dihydro-oxazole (7b). According to general procedure II: 69 % yield; colorless oil (kugelrohr distillation: 0.004 mbar, 125 - 130 °C). $[\alpha]_D^{20}$ = - 55.5 (CH_2Cl_2, c = 2.37). ^{1}H NMR: δ = 0.97, 1.04 [2d, J = 6.8 Hz, 6H, $CH(CH_3)_2$], 1.89 [dqq, J = 6.7 Hz, 1H, $CH(CH_3)_2$], 4.10 - 4.19, 4.37 - 4.46 (2m, 2H and 1H, CHN, OCH_2), 7.25 (ddd, J = 9.2 Hz, 7.5 Hz, 1.9 Hz, 1H, Ar-H), 7.32 (ddd, J = 7.4 Hz, 1.4 Hz, 1H, Ar-H), 7.61 (dd, J = 7.8 Hz, 1.3 Hz, 1H, Ar-H), 7.65 (dd, J = 7.6 Hz, 1.9 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.25, 18.77 [2q, $CH(CH_3)_2$], 32.69 [d, $CHCH(CH_3)_2$], 70.35 (t, OCH_2), 72.99 (d, CHN), 121.82 (s, C-Ar), 127.04 (d, C-Ar), 130.26 (s, C-Ar), 131.30, 131.46, 133.72 (3d, C-Ar),162.85 (s, C=N). Anal. Calcd for $C_{12}H_{14}BrNO$ (268.16): C, 53.75: H, 5.26; N, 5.22; Br, 29.80. Found: C, 53.68; H, 5.39; N, 5.35; Br, 29.56.

(+)-(*R*)-2-(2-Fluoro-phenyl)-4-phenyl-4,5-dihydro-oxazole (*ent*-**6c**). According to general procedure II: 48 % yield; yellowish oil (kugelrohr distillation: 0.02 mbar, 120 - 130 °C). TLC: R_f = 0.27 (PE/ethyl acetate 4:1). $[\alpha]_D^{20}$ = + 19.7 (c = 3.02, CH_3OH). ^{1}H NMR: δ = 4.24 (t, 1H, J = 8.2 Hz, OCH_AH_B), 4.75 (dd, 1H, J = 10.2 Hz, J = 8.2 Hz, OCH_AH_B) 5.41 (dd, 1H, J = 10.2 Hz, J = 8.2 Hz, CHN), 7.11 - 7.47 (m, 8H, Ar-H), 7.96 - 8.02 (m, 1H, Ar-H). ^{13}C NMR: δ = 70.20 (d, CHN), 74.60 (t, OCH_2), 116.00 (d, $J_{C,F}$ = 11 Hz, C-1'), 116.76 (dd, $J_{C,F}$ = 22 Hz, C-3'), 124.00 (d, $J_{C,F}$ = 4 Hz, C-5'), 126.75, 127.65, 128.77 (3d, C-Ar), 131.38 (d, J = 2 Hz, C-6'), 133.14 (d, J = 9 Hz, C-4'), 142.21 (s, C-Ar), 161.35 (d, J = 259 Hz, C-2'), 161.69 (d, C=N, J = 5 Hz). Anal. Calcd for $C_{15}H_{12}FNO$ (241.26): C, 74.67; H, 5.02; N, 5.81. Found. C, 74.75; H, 5.30; N, 5.96.

(-)-(*S*)-2-(2-Fluoro-phenyl)-4-benzyl-4,5-dihydro-oxazole (6d). According to general procedure II: 58 % yield; colorless oil. $[\alpha]_D^{20}$ = - 20.2 (c = 1.77, CH_2Cl_2). ^{1}H NMR: δ = 2.75 (dd, J = 13.7 Hz, 8.9 Hz, 1H, CH_AH_BPh), 3.28 (dd, J = 13.7 Hz, 4.9 Hz, 1H, CH_AH_BPh), 4.14 (dd, J = 8.4 Hz, 7.4 Hz, 1H, OCH_AH_B), 4.29-4.35 (m, 1H, OCH_AH_B), 4.58-4.68 (m, 1H, CHN), 7.12 - 7.43 (m, 7H, Ar-H), 7.46 - 7.49 (m, 1H, Ar-H). ^{13}C NMR: δ = 41.67 (t, CH_2Ph), 68.09 (d, CHN), 71.41 (t, OCH_2), 116.4 (d, $J_{C,F}$ = 10.6 Hz, C-1'), 116.68 (d, $J_{C,F}$ = 22.0 Hz, C-3'), 123.95 (d, $J_{C,F}$ = 3.4 Hz, C-4'), 126.58, 128.58, 129.33 (5d, Ar-C), 131.15 (d, $J_{C,F}$ = 1.6 Hz, C-5'), 132.90 (d, $J_{C,F}$ = 8.7 Hz, C-6'), 137.84 (s, C-Ar),

160.76 (d, $J_{C,F}$ = 5.2 Hz, C=N), 161.22 (d, $J_{C,F}$ = 258.0 Hz, C-F). Anal. Calcd for $C_{16}H_{14}FNO$ (255.29): C, 75.28; H, 5.53; N, 5.49. Found: C, 75.52; H, 5.60; N, 5.54.

4-*tert*-Butyl-2-(2-fluorophenyl)-4,5-dihydro-oxazole (6e). According to general procedure II: 34 % yield; yellowish oil. TLC: R_f = 0.33 (PE/ethyl acetate 9:1). $[\alpha]_D^{20}$ = - 79.8 (c = 3.185, $CHCl_3$). ^{1}H NMR: δ = 0.96 (s, 9H, CH_3), 4.07 (dd, *J* = 10.2 Hz, 7.6 Hz, 1H, OCH_AH_B), 4.23 (dd, *J* = 8.6 Hz, 7.6 Hz, 1H, CHN), 4.34 (dd, *J* = 10.2 Hz, 8.6 Hz, 1H, OCH_AH_B), 7.09 - 7.19 (m, 2H, 3'-H, 5'-H), 7.38 - 7.46 (m, 1H, 4'-H), 7.87 (dt, *J* = 7.4 Hz, 1.8 Hz, 1H, 6'-H). ^{13}C NMR: δ = 25.9 (q, CH_3), 34.0 (s, *C*-CH_3), 68.6 (t, OCH_2), 76.2 (d, CHN), 116.4 (s, C-1'), 116.6 (d, $J_{C,F}$ = 21.9 Hz, C-3'), 123.9 (d, $J_{C,F}$ = 3.8 Hz, C-5'), 131.2 (d, $J_{C,F}$ = 2.3 Hz, C-6'), 132.6 (d, $J_{C,F}$ = 8.3 Hz, C-4'), 160.2 (d, $J_{C,F}$ = 5.3 Hz, C=N), 161.1 (d, $J_{C,F}$ = 257.8 Hz, C-F). Anal. Calcd for $C_{13}H_{16}FNO$ (221.27): C, 70.57; H, 7.29; N, 6.33. Found: C, 70.66; H, 7.28; N, 6.30.

(+)-(*S*)-(2-Fluorophenyl)-4-(1-indolylmethyl)-4,5-dihydro-oxazole (6f). According to general procedure II: 40 % yield; colorless crystals, mp 140.5 - 142.0 °C. TLC: R_f = 0.20, PE/ethyl acetate 1:1. $[\alpha]_D^{20}$ = + 50.9 (c = 2.41, EtOH). ^{1}H NMR: δ = 2.91 (dd, *J* = 14.5 Hz, 9.2 Hz, 1H, CH_AH_B-Ind), 3.42 (dd, *J* = 14.4 Hz, 9.2 Hz, 1H, CH_AH_B-Ind), 4.18 (t, *J* = 7.5 Hz, 1H, OCH_AH_B), 4.34 (t, *J* = 8.5 Hz, 1H, OCH_AH_B), 4.70-4.85 (m, 1H, CHN), 7.05 (d, *J* = 2.1 Hz, 1H, Ar-H), 7.09-7.26 (m, 4H, Ar-H), 7.35 (dd, *J* = 16.5 Hz, 1.2 Hz, 1H, Ar-H), 7.40-7.50 (m, 1H, Ar-H), 7.68 (dd, *J* = 8.5 Hz, 1.4 Hz, 1H, Ar-H), 7.84-7.92 (m, 1H, NHC*H*), 8.27 (s, 1H, NH). ^{13}C NMR: δ = 31.30 (t, CH_2-Indolyl), 67.26 (d, CHN=), 71.91 (t, OCH_2), 111.22 (d, NHCH=C), 111.90 (s, CH=*C*), 116.23 (d, C-Ar), 116.7 (s, C-Ar), 118.86, 119.48, 122.11, 122.51 (d, C-Ar), 124.00 (d, C-Ar), 127.70 (s, C-Ar), 131.16 (d, C-Ar), 132.90 (d, C-Ar), 136.33 (s, C-Ar), 160.7 (s, C=N), 161.23 (d, C-Ar). Anal. Calcd for $C_{18}H_{15}N_2OF$ (294.33): C, 73.45; H, 5.14; N, 9.52. Found: C, 73.67; H, 5.28; N, 9.56.

(-)-(*S*)-2-(2-Fluorophenyl)-4-(2-methylsulfanyl-ethyl)-4,5-dihydro-oxazole (6g). According to general procedure II: 37 % yield; yellowish oil. TLC: R_f = 0.20 (PE/ethyl acetate 4:1). $[\alpha]_D^{20}$ = - 86.8 (c = 1.875, $CHCl_3$). ^{1}H NMR: δ = 1.78 - 2.06 (m, 2H, CH_2CH), 2.08 (s, 3H, CH_3), 2.52 - 2.72 (m, 2H, SCH_2), 4.01 (d, *J* = 7.0 Hz, 1H, OCH_ACH_B), 4.35 - 4.50 (m, 2H, CHN, OCH_ACH_B), 7.04 - 7.16 (m, 2H, Ar-H), 7.36 - 7.43 (m, 1H, Ar-H), 7.83 (dt, *J* = 7.5 Hz, 1.7 Hz, 1H, Ar-H). ^{13}C NMR: δ = 15.4 (q, CH_3), 30.5 (t, CH_2CH), 35.2 (t, SCH_2), 65.8 (d, CHN), 71.9 (t, OCH_2), 115.9 (d, $J_{C,F}$ = 11.3 Hz, C-1'), 116.5 (d, $J_{C,F}$ = 21.9 Hz, C-3'), 123.8 (d, $J_{C,F}$ = 3.8 Hz, C-5'), 131.0 (d, $J_{C,F}$ = 1.5 Hz, C-6'), 132.7 (d, $J_{C,F}$ = 9.1 Hz, C-4'), 160.4 (d, $J_{C,F}$ = 5.3 Hz, C=N), 161.0 (d, $J_{C,F}$ = 257.8 Hz, C-2'). Anal. Calcd for $C_{12}H_{14}FNOS$ (239.31): C, 60.22; H, 5.89; N, 5.85; S, 13.40. Found: C, 60.45; H, 6.07; N, 5.89; S, 13.20.

(+)-(*R*)-2-(2-Fluoro-phenyl)-4-phenyl-4,5-dihydro-oxazole (*ent*-**6c**). **General Procedure III (Method B).** To a refluxing solution of 242 mg (2.00 mmol) of 2-fluorobenzonitril and 2.00 mmol of $ZnCl_2OEt_2$ in 2 mL of dry chlorobenzene was added dropwise within 3 h a solution of 274.4 mg (2.00 mmol) of *ent*-**5c** in 2 mL of dry chlorobenzene. Heating was continued for 8 h. Argon was bubbled through the apparatus to remove the ammonia that was generated during the reaction. The mixture was diluted with 20 mL ethyl acetate and filtered over a silica gel pad. After removal of the solvent *in vacuo*, the residue was purified by flash chromatography [30 g silica gel, PE/ethyl acetate 80:20, R_f(*ent*-**6c**) = 0.27] to yield 11.4 mg (23 %) of a colorless oil. $[\alpha]_D^{20}$ = + 19.7 (c = 3.02, MeOH). ^{1}H NMR: δ = 4.24 (t, *J* = 8.2 Hz, 1H, OCH_ACH_B), 4.75 (dd, *J* = 10.2 Hz, *J* = 8.2 Hz, 1H; OCH_ACH_B), 5.41 (dd, *J* = 10.2 Hz, *J* = 8.2 Hz, 1H, CHN), 7.11 - 7.47 (m, 8H, Ar-H), 7.96 - 8.02 (m, 1H, Ar-H). ^{13}C NMR: δ = 70.20 (d, CHN), 74.60 (t, OCH_2), 116.00 (d, $J_{C,F}$ = 11 Hz, C-1'), 116.76 (d, $J_{C,F}$ = 22 Hz, C-3'), 124.00 (d, $J_{C,F}$ = 4 Hz, C-5'), 126.75, 127.65, 128.77 (3d, C-Ar), 131.38 (d, *J* = 2 Hz, C-6'),

133.09 (d, J = 9 Hz, C-4'), 142.21 (s, C-Ar), 161.35 (d, J = 259 Hz, C-2'), 161.69 (d, J = 5 Hz, C=N). Anal. Calcd for $C_{15}H_{12}FNO$ (241.26): C, 74.67; H, 5.02; N, 5.81. Found. C, 74.75; H, 5.30; N, 5.96.

(-)-(1*R*,2*S*,6*R*,7*S*)-4-(2-Fluorophenyl)-1,10,10-trimethyl-3-oxa-5-azatricyclo[5.2.1.0^{2,6}]-dec-4-ene (*ent*-**6h**). **General Procedure IV (Method C).** To a solution of 1.80 g of amino alcohol *ent*-**5h**[35] (10.63 mmol) and 2.16 g (10.61 mmol) of ethyl 2-fluorobenzeneimidate hydrochloride (prepared from o-fluoro-benzonitrile and HCl/ethanol[36]) in 30 mL of CH_2Cl_2 was added dropwise a solution of 1.5 mL of triethylamine in 2 mL of CH_2Cl_2. Stirring was continued for 4 days at room temperature. The reaction mixture was extracted two times with water, dried over Na_2SO_4, filtered and evaporated under reduced pressure to give a slightly yellow oil. The product was purified by flash column chromatography (silica gel, PE/ethyl acetate 9:1) to yield 1.30 g (45 %) of a solid. Analytically pure product was obtained by crystallization from light PE. Mp 76.5 - 78.0 °C. $[\alpha]_D^{20}$ = - 25.2 (c = 1.045, CH_2Cl_2). ^{1}H NMR: δ = 0.87 (s, 3H, CH_3), 0.94 (s, 3H, CH_3), 1.10 (s, 3H and m, 2H), 1.53 (m, 1H), 1.76 (m, 1H), 2.19 (d, J = 4.6 Hz, 1H), 4.22 (d, J = 8.5 Hz, 1H, OCH), 4.39 (d, J = 8.5 Hz, 1H, CHN), 7.14 (m, 2H, Ar-H), 7.43 (m, Ar-H), 7.82 (m, Ar-H). ^{13}C NMR: δ = 11.33 (q, CH_3), 18.69 (q, CH_3), 23.48 (q, CH_3), 26.04 (t, CH_2), 32.16 (t, CH_2), 47.00 (s), 48.67 (s), 48.96 (d, CH-CHN), 76.72 (d, CHN), 90.96 (d, OCH), 116.62 (d, $J_{C,F}$ = 22 Hz, C-Ar), 116.70 (d, $J_{C,F}$ = 11 Hz, C-Ar), 123.90 (d, $J_{C,F}$ = 4 Hz, C-Ar), 131.00 (d, $J_{C,F}$ = 2 Hz, C-Ar), 132.66 (d, $J_{C,F}$ = 9 Hz, C-Ar), 161.18 (d, $J_{C,F}$ = 258 Hz, C-F), 161.97 (d, $J_{C,F}$ = 6 Hz, C=N). Anal. Calcd for $C_{17}H_{20}FNO$ (273.15): C, 74.70; H, 7.37; N, 5.12. Found: C, 74.90; H, 7.50; N, 5.26.

2-Fluoro-*N*-(2-hydroxy-1,1-dimethyl-ethyl)-benzamide (**9i**). **General Procedure V.** To a solution of 3.60 g (40.0 mmol) of **5i** and 7.90 g (78.0 mmol) of dry triethylamine in 60 mL of dry dioxane was added at 0 °C a solution of 6.01 g (38.0 mmol) of 2-fluorobenzoyl chloride in 50 mL of dry dioxane. The formation of a white precipitate was observed. After stirring for an additional 1.5 h the solvent and excess triethylamine were removed *in vacuo*. The residue was filtered over a short pad of silica gel and the resulting oil was purified by flash chromatography (220 g of silica gel, PE/ethyl acetate 2:1, R_f = 0.12) to yield after recrystallization (ethyl acetate/*n*-hexane) 7.60 g (95 %) of colorless crystals, mp 64.0 - 65.0 °C. ^{1}H NMR: δ = 1.40 (s, 6H, CH_3), 3.68 (d, J = 6.1 Hz, 2H, OCH_2), 4.69 (t, J = 6.1 Hz, 1H, OH, H/D exchange), 6.84, (br. d, $J_{NH,F}$ = 13.8 Hz, 1H, NH, H/D exchange), 7.07 - 7.13 (m, 1H, Ar-H), 7.22 - 7.27 (m, 1H, Ar-H), 7.42 - 7.50(m, 1H, Ar-H), 7.99 - 8.05 (m, 1H, Ar-H). ^{13}C NMR: δ = 24.73 (q, CH_3), 56.68 (s, $C(CH_3)_2$), 70.54 (t, $HOCH_2$), 116.03 (d, $J_{C,F}$ = 24.9 Hz, C-3'), 121.47 (s, $J_{C,F}$ = 11.2 Hz, C-1'), 124.07 (d, $J_{C,F}$ = 3.3 Hz, C-Ar), 131.86 (d, $J_{C,F}$ = 1.8 Hz, C-5'), 133.42 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 160.42 (d, $J_{C,F}$ = 246.7 Hz, C-F), 163.82 (s, C=O). Anal. Calcd for $C_{11}H_{14}FNO_2$ (211.24): C, 62.55; H, 6.68; N, 6.63. Found: C, 62.68; H, 6.81; N, 6.74.

(+)-(*R*)-2-Fluoro-N-(2-hydroxy-1-phenyl-ethyl)-benzamide (*ent*-**9c**). According to general procedure V: 77 % yield; colorless needles (ethanol), mp 116.5 - 117.5 °C. TLC: R_f = 0.23 (PE/ethyl acetate 1:1). $[\alpha]_D^{20}$ = + 12.5, (c = 1.73, $CHCl_3$). ^{1}H NMR: δ = 3.64 (dd, J = 6.5 Hz, 5.9 Hz, 2H, OCH_2), 4.94 (t, J = 5.8 Hz, 1H, OH, H/D exchange), 5.00 - 5.07 (m, 1H, CHN), 7.21-7.39 (m, 7H, Ar-H), 7.49-7.63 (m, 2H, Ar-H), 8.63 (d, J = 7.6 Hz, 1H, NH, H/D exchange). ^{13}C NMR: δ = 56.27 (d, CHN), 66.49 (t, OCH_2), 116.04 (d, $J_{C,F}$ = 24 Hz, C-3'), 120.95 (d, $J_{C,F}$ = 12 Hz, C-1'), 124.84 (d, $J_{C,F}$ = 3 Hz, C-5'), 126.72, 127.87, 128.91 (3d, C-Ar), 132.08 (d, J = 2 Hz, C-6'), 133.47 (d, $J_{C,F}$ = 9 Hz, C-4'), 139.01 (s, C-Ar), 160.47 (d, $J_{C,F}$ = 247 Hz, C-Fr), 163.60 (d; $J_{C,F}$ = 3 Hz, C=O). Anal. Calcd for $C_{15}H_{14}FNO_2$ (259.28): C, 69.47; H, 5.45; N, 5.40. Found: C, 69.53; H, 5.64; N, 5.50.

(+)-(*S*)-2-Fluoro-*N*-(1-hydroxymethyl-2,2-dimethylpropyl)-benzamide (**9e**). According to general procedure V: > 99 % yield; needles after recrystallization from ethyl acetate/PE. Mp 93.5 °C - 94.5

°C. $[\alpha]_D^{20}$ = + 28.9 (c 1.195, CH_3OH). ^1H NMR: δ = 1.00 [s, 9H, $C(CH_3)_3$], 3.07 (br.s, 1H, OH, H/D exch.), 3.63 (m, 1H, OCH_AH_B), 3.92 (br.d, 1H, OCH_AH_B), 4.06 (m, 1H, CHN), 6.94 (br.t, 1H, NH), 7.08 (ddd, *J* = 12.2, 8.3, 1 Hz, 1H, Ar-H), 7.21 (m, 1H, Ar-H), 7.43 (m, 1H, Ar-H), 8.02 (dt, *J* = 7.9, 1.9 Hz, 1H, Ar-H). ^{13}C NMR: δ = 27.0 [q, $C(CH_3)_3$], 33.67 [s, $C(CH_3)_3$], 60.40 (d, OCH_2), 63.24 (t, CHN), 116.0 (d, $J_{C,F}$ = 24.9 Hz, C-Ar), 121.11 (s, $J_{C,F}$ = 11 Hz, C-Ar), 124.82 (d, $J_{C,F}$ = 3 Hz, C-Ar), 132.15 (d, $J_{C,F}$ = 2.1 Hz, C-Ar), 133.29 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 160.64 (s, $J_{C,F}$ = 249 Hz, C-F), 164.56 (s, C=O). Anal. Calcd for $C_{13}H_{18}FNO_2$ (350.21): C, 65.25; H, 7.58; N, 5.85. Found: C, 65.24; H, 7.78; N, 5.83.

(-)-(*S*)-2-Fluoro-*N*-(2-hydroxy-1-methyl-ethyl)-benzamide (9j). According to general procedure V: 96 % yield; colorless needles (ethyl acetate/*n*-hexane), mp 87.0 - 88.0 °C. TLC: R_f = 0.22 (PE/ethyl acetate 2:1). $[\alpha]_D^{20}$ = -2.8 (c = 1.89, $CHCl_3$). ^1H NMR: δ = 1.28 [d, *J* = 6.8 Hz, 3H, CH_3], 3.21 [t, *J* = 5.5 Hz, 1H, OH, H/D exchange], 3.59 - 3.67 (m, 1H, $HOCH_AH_B$), 3.71 - 3.78 (m, 1H, $HOCH_AH_B$), 4.27 - 4.31 (m, 1H, CHN), 6.80 - 7.00 (m, 1H, NH, H/D exchange), 7.05 - 7.11 (m, 1H, Ar-H), 7.20 - 7.26 (m, 1H, Ar-H), 7.40 - 7.48 (m, 1H, Ar-H), 7.99 - 8.05 (m, 1H, Ar-H). ^{13}C NMR: δ = 17.11 (q, CH_3), 48.24 (d, CHNH), 66.83 (t, $HOCH_2$), 116.00 (d, $J_{C,F}$ = 24.8 Hz, C-3'), 121.04 (s, $J_{C,F}$ = 11.3 Hz, C-1'), 124.79 (d, $J_{C,F}$ = 3.2 Hz, C-Ar), 131.94 (d, $J_{C,F}$ = 2.0 Hz, C-5'), 133.34 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 160.59 (s, $J_{C,F}$ = 247.5 Hz, C-F), 163.78 (s, C=O). Anal. Calcd for $C_{10}H_{12}FNO_2$ (197.21): C, 60.91; H, 6.13; N, 7.10. Found: C, 61.13; H, 6.16; N, 7.24.

(+)-(1*S*,2*S*)-2-Fluoro-*N*-[2-hydroxy-1-hydroxymethyl-2-phenylethyl]benzamide (*ent*-9k). According to general procedure V, except that the reaction was carried out in ether/0.5M aqueous KOH; quantitative yield; colorless oil. $[\alpha]_D^{20}$ = + 131.0 (c = 1.025, CH_2Cl_2). ^1H NMR (CD_3OD): δ = 3.67 (dd, *J* = 10.8, 5.4 Hz, 1H, $HOCH_AH_B$), 3.82 (dd, *J* = 10.8, 6.9 Hz, 1H, CHN), 4.35 (m, 1H, $HOCH_AH_B$), 5.11 (d, *J* = 3.4 Hz, 1H, CHPh), 7.14 - 7.33 (m, 6H, Ar-H), 7.43 - 7.52 (m, 3H, Ar-H), 7.72 (m, 1H, Ar-H). ^{13}C NMR (CD_3OD): δ = 58.98 (d, CHPhOH), 62.60 (t, $HOCH_2$), 72.25 (d, CHNH), (d, $J_{C,F}$ = 24 Hz, C-Ar), 123.17 (s, J_{CF} = 13 Hz, C-Ar), 125.77 (d, $J_{C,F}$ = 3 Hz, C-Ar), 127.27 (d, C-Ar), 128.48 (d, C-Ar), 129.26 (d, C-Ar), 132.00 (d, $J_{C,F}$ = 2 Hz, C-Ar), 134.52 (d, $J_{C,F}$ = 9 Hz, C-Ar), 161.69 (s, $J_{C,F}$ = 249 Hz, C-Ar), 166.24 (s, C=O). Anal. Calcd for $C_{16}H_{16}FNO_3$ (289.11): C, 66.43; H, 5.57; N, 4.84. Found: C, 66.57; H, 5.66; N, 4.96.

(+)-(*R*)-2-Fluoro-*N*-(1-hydroxymethyl-2-isobutylsulfanyl-2-methylpropyl)-benzamide (*ent*-9l). According to general procedure V, except that the reaction was carried out in ether/0.5M aqueous KOH; quantitative yield; a colorless, highly viscous oil. $[\alpha]_D^{20}$ = + 37.9 (c = 2.125, $CHCl_3$). ^1H NMR (CD_3OD): δ = 0.967, 0.969 (2d, *J* = 6.6 Hz, 6H, 2 CH_3), 1.40 (s, 6H, 2 CH_3), 1.75 [septet, *J* = 6.7 Hz, 1H $CH(CH_3)_2$], 2.46 (d, *J* = 6.8 Hz, 2H, SCH_2), 3.37 (br. s, 1H, OH, H/D-exchange), 3.86, (dd, *J* = 11.6 Hz, 6.0 Hz, 1H, $HOCH_AH_B$), 3.95 (dd, *J* = 11.6 Hz, 3.7 Hz, 1H, $HOCH_AH_B$), 4.21 (m, 1H, CHN), 7.11 (ddd, *J* = 12.1 Hz, 8.3 Hz, 0.9 Hz, 1H, 3'-H), 7.24 (ddd, *J* = 7.8 Hz, 7.4 Hz, 1.0 Hz, 1H, 5'-H), 7.42 - 7.50 (m, 2H, 4'-H, NH, H/D-exchange with trifluoro acetic acid), 8.05 (dt, *J* = 7.9 Hz, 1.9 Hz, 1H, 6'-H). ^{13}C NMR: δ = 22.18 (q, CH_3), 22.23 (q, CH_3), 26.7 (q, CH_3), 27.1 (q, CH_3), 28.9 [d, $CH(CH_3)_2$], 36.9 (t, SCH_2), 47.5 [s, $C(CH_3)_2S$], 59.9 (d, CHN), 63.5 (t, OCH_2), 116.1 (d, $J_{C,F}$ = 24.9 Hz, C-3'), 121.0 (d, $J_{C,F}$ = 11.3 Hz, C-1'), 124.8 (d, $J_{C,F}$ = 3.0 Hz, C-5'), 132.1 (d, $J_{C,F}$ = 1.5 Hz, C-6'), 133.4 (d, $J_{C,F}$ = 9.1 Hz, C-4'), 160.7 (d, $J_{C,F}$ = 248.0 Hz, C-2'), 164.4 (d, CO, $J_{C,F}$ = 3.2 Hz). Anal. Calcd for $C_{16}H_{24}FNO_2S$ (313.43) C, 61.31; H, 7.72; N, 4.47; S, 10.23. Found: C, 61.06; H, 7.98; N, 4.51; S, 9.96.

(+)-(*S*)-*N*-(2-Hydroxy-1-carboxymethyl-ethyl)-2-fluoro-benzamide (9n). According to general procedure V, except that the reaction was carried out in water/$NaHCO_3$; 96 % yield, colorless needles (ethyl acetate), mp 101.0 - 102.0 °C. $[\alpha]_D^{20}$ = +35.4 , (c = 1.35, $CHCl_3$). ^1H NMR: δ = 2.95 (t, *J* = 5.9 Hz, 1H, OH, H/D exchange), 3.80 (s, 3H, $COOCH_3$), 3.99 - 4.11 (m, 2H, $HOCH_2$), 4.83 - 4.89 (m, 1H, CHN), 7.11 (dd, *J* = 12.0 Hz, 8.3 Hz, 1H, Ar-H), 7.27 (td, *J* = 7.5 Hz, 1.2 Hz, 1H, Ar-H), 7.43-

7.51 (m, 1H, Ar-H), 7.67 [m, 1H, NH (H/D exchange)], 8.03 (td, J = 7.8 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 52.88 (q, $COOCH_3$), 55.35 (d, CHN), 63.26 (t, $HOCH_2$), 116.17 (d, $J_{C,F}$ = 24.5 Hz, C-Ar), 120.32 (d, $J_{C,F}$ = 10.4 Hz, C-1'), 124.79 (d, $J_{C,F}$ = 3.3 Hz, C-Ar), 131.92 (d, $J_{C,F}$ = 1.7 Hz, C-Ar), 133.78 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 161.31 (d, $J_{C,F}$ = 248.8 Hz, C-F), 163.64 [s, (C=O)N], 170.78 (s, C=O). Anal. Calcd for $C_{11}H_{12}FNO_4$ (241.21): C, 54.77; H, 5.01; N, 5.81. Found: C, 54.88; H, 5.12; N, 5.93.

(+)-(*S*)-2-(2-Fluoro-benzoylamino)-3-(1H-imidazol-4-yl)-propionic acid-methyl ester (12). According to general procedure V, except that the reaction was carried out in chloroform; yield 77 %, colorless needles (ethyl acetate), mp 140.5 - 142.0 °C. $[\alpha]_D^{20}$ = + 46.5 (c = 1.07, $CHCl_3$). ^{1}H NMR (CD_3OD): δ = 3.21 (d, J = 5.4 Hz, 2H, CH_2-Imidazole), 3.69 (s, 3H, $COOCH_3$), 4.99 - 5.05 (m, 1H, CHN), 6.80 (s, 1H, C=CH-N), 7.09 (ddd, J = 11.8 Hz, 8.3 Hz, 1.0 Hz, 1H, Ar-H), 7.22 (td, J = 7.6 Hz, 1.0 Hz, 1H, Ar-H), 7.45 (ddd, J = 15.5 Hz, 5.1 Hz, 1.9 Hz, 1H, Ar-H), 7.53 (s, 1H, N=CH-N), 8.02 (td, J = 7.8 Hz, 1.9 Hz, 1H, Ar-H). ^{13}C NMR (CD_3OD): δ = 30.00 (t, CH_2-Imidazole), 52.91 (q, $COOCH_3$), 54.68 (d, CHN), 117.28 (d, $J_{C\text{-}F}$ = 24 Hz, C-3'), 118.02 (bd, C=*C*H-N), 123.26 (d, $J_{C\text{-}F}$ = 7 Hz, C-1'), 125.68 (d, $J_{C\text{-}F}$ = 3.0 Hz, C-4'), 131.69 (d, $J_{C\text{-}F}$ = 2 Hz, C-6'), 134.58 (d, $J_{C\text{-}F}$ = 9 Hz, C-4'), 134.69 (bs, *C*=CH-N), 136.54 (d, N=CH-N), 161.61 (s, $J_{C\text{-}F}$ = 250 Hz, C-F), 166.43 (d, $J_{C\text{-}F}$ = 3 Hz, C(=O)N), 173.19 (s, *C*OOCH$_3$). Anal. Calcd for $C_{14}H_{14}FN_3O_3$ (291.31): C, 57.72; H, 4.85; N, 14.43. Found: C, 57.85; H, 4.95; N, 14.45.

N-(2-Chloro-1,1-dimethyl-ethyl)-2-fluoro-benzamide (10i). General Procedure VI (Method D, part 1). 2.07 g (17.4 mmol) of freshly destilled thionyl chloride were dropped at 0 °C to a solution of 1.23 g (5.81 mmol) of **9i** in 40 mL of dry toluene. After heating to reflux for 1 h complete conversion was reached. The solvent and excess thionyl chloride were removed *in vacuo*. The residue was stirred with ethyl acetate and the solvent removed *in vacuo*. The residue was purified by flash chromatography [170 g silica gel, PE/ethyl acetate 85:15, R_f(**10i**) = 0.23]. Recrystallization (*n*-hexane) furnished 1.31 g (98 %) of colorless needles, mp 55.0 - 56.0 °C. ^{1}H NMR: δ = 1.53 (s, 6H, CH_3), 3.92 (s, 2H, $ClCH_2$), 6.67 [br. d, $J_{NH\text{-}F}$) = 12.9 Hz, 1H, NH], 7.07 - 7.14 (m, 1H, Ar-H), 7.22 - 7.27 (m, 1H, Ar-H), 7.42 - 7.49 (m, 1H, Ar-H), 8.00 - 8.06 (m, 1H, Ar-H).^{13}C NMR: δ = 25.30 (q, CH_3), 51.27 (t, $ClCH_2$), 54.68 [s, *C*$(CH_3)_2$], 116.02 (d, $J_{C,F}$ = 25.1 Hz, C-3'), 121.71 (s, $J_{C,F}$ = 11.6 Hz, C-1'), 124.79 (d, $J_{C,F}$ = 3.2 Hz, C-Ar), 131.79 (d, $J_{C,F}$ = 2.0 Hz, C-5'), 133.22 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 160.52 (d, $J_{C,F}$ = 246.7 Hz, C-F), 162.71 (s, C=O). Anal. Calcd for $C_{11}H_{13}ClFNO$ (229.68): C, 57.52; H, 5.70; N, 6.10 N, Cl, 15.44. Found: C, 57.75; H, 5.81; N, 6.28; Cl, 15.70.

(-)-(*R*)-N-(2-Chloro-1-phenyl-ethyl)-2-fluoro-benzamide (*ent*-**10c**). According to general procedure VI: >99 % yield; colorless crystals, mp 117.5 - 118.5 °C. TLC: R_f = 0.51 (PE/ethyl acetate 1:1). $[\alpha]_D^{20}$ = - 26.5, (c = 1.75, MeOH). ^{1}H NMR: δ = 3.92 (dd, J = 11.4 Hz, 5.5 Hz, 1H, $ClCH_AH_B$), 4.00 (dd, J = 11.4 Hz, 4.8 Hz, 1H, $ClCH_AH_B$), 5.59 - 5.62 (m, 1H, CHN), 7.16 (dd, 1H, J = 12.2 Hz, 8.3 Hz, 1H, Ar-H), 7.25 - 7.54 (m, 8H, Ar-H, NH), 8.11 (td, J = 7.9 Hz, 1.9 Hz, 1H, Ar-H). ^{13}C NMR: δ = 47.79 (t, $ClCH_2$), 54.26 (d, CHN), 116.11 (d, $J_{C,F}$ = 25 Hz, C-3'), 120.57 (d, $J_{C,F}$ = 11.3 Hz, C-1'), 124.84 (d, $J_{C,F}$ = 3 Hz, C-5'), 126.73, 128.20, 128.88 (3d, C-Ar), 132.24 (d, $J_{C,F}$ = 2 Hz, C-6'), 133.66 (d, $J_{C,F}$ = 9 Hz, C-4'), 138.45 (s, C-Ar), 160.83 (d, $J_{C,F}$ = 248 Hz, C-F), 162.80 (d; $J_{C,F}$ = 3 Hz, NC=O). Anal. Calcd for $C_{15}H_{13}ClFNO$ (277.73): C, 64.86; H, 4.73; Cl, 12.76; N, 5.04. Found: C, 64.94; H, 4.89; Cl, 12.91; N, 5.25.

(-)-(*S*)-*N*-(2-Chloro-1-methyl-ethyl)-2-fluoro-benzamide (10j). According to general procedure VI: 99 % yield; colorless needles, mp 76.5 - 77.5 °C. TLC: R_f = 0.35 (PE/ethyl acetate 2:1). $[\alpha]_D^{20}$ = - 33.9 (c = 2.89, $CHCl_3$). ^{1}H NMR: δ = 1.35 [d, J = 6.8 Hz, 3H, CH_3], 3.66 (dd, J = 11.1 Hz, 3.4 Hz, 1H, $ClCH_ACH_B$), 3.80 (dd, J = 11.1 Hz, 4.4 Hz, 1H, $ClCH_ACH_B$), 4.58 - 4.63 (m, 1H, CHN), 6.80 - 7.00 (br.

m, 1H, NH), 7.08 - 7.15 (m, 1H, Ar-H), 7.23 - 7.28 (m, 1H, Ar-H), 7.43 - 7.51 (m, 1H, Ar-H), 8.04 - 8.11 (m, 1H, Ar-H). ^{13}C NMR: δ = 17.97 (q, CH_3), 45.93 (d, CHN), 49.16 (t, $ClCH_2$), 116.07 (d, $J_{C,F}$ = 24.8 Hz, C-3'), 120.83 (d, $J_{C,F}$ = 11.5 Hz, C-1'), 124.83 (d, $J_{C,F}$ = 3.3 Hz, C-Ar), 132.01 (d, $J_{C,F}$ = 2.1 Hz, C-5'), 133.46 (d, $J_{C,F}$ = 9.4 Hz, C-Ar), 160.68 (s, $J_{C,F}$ = 247.5 Hz, C-F), 162.32 (s, C=O). Anal. Calcd for $C_{10}H_{11}ClFNO$ (215.65): C, 55.70; H, 5.14; N, 6.49; Cl, 16.44. Found: C, 55.89; H, 5.21; N, 6.52; Cl, 16.45.

2-(2-Fluoro-phenyl)-4,4-dimethyl-4,5-dihydro-oxazole (**6i**). **General Procedure VII (Method D, part 2).** A solution of 1.20 g (5.20 mmol) of **10i** and 313 mg (7.70 mmol) of NaOH in 40 mL of methanol was heated to reflux for 3 h. After cooling to rt, 100 mL of ether were added and the resulting solution was extracted three times with brine. The organic layer was separated, dried over Na_2SO_4 and the solvent removed *in vacuo*. The residue was flash filtered [100 g silica gel, PE/ ethyl acetate 2:1, R_f (**6i**) = 0.32] and subsequently kugelrohr distilled (150 °C, 17 mbar) to give colorless crystals, mp 59.5 - 60.0 °C. ^{1}H NMR: δ = 1.39 (s, 6H, CH_3), 4.09 (s, 2H, OCH_2), 7.08 - 7.18 (m, 2H, Ar-H), 7.38 - 7.45 (m, 1H, Ar-H), 7.83 - 7.88 (m, 1H, Ar-H). ^{13}C NMR: δ = 28.35 (q, CH_3), 67.76 [s, $C(CH_3)_2$], 78.87 (t, OCH_2), 116.46 (d, $J_{C,F}$ = 10.7 Hz, C-1'), 116.59 (d, $J_{C,F}$ = 22.1 Hz, C-3'), 123.87 (d, $J_{C,F}$ = 3.8 Hz, C-Ar), 131.18 (d, $J_{C,F}$ = 1.7 Hz, C-5'), 132.68 (d, $J_{C,F}$ = 8.6 Hz, C-Ar), 158.95 (d, $J_{C,F}$ = 5.0 Hz, C=N), 161.10 (d, $J_{C,F}$ = 257.4 Hz, C-F). Anal. Calcd for $C_{11}H_{12}FNO$ (193.22): C, 68.38; H, 6.26. Found: C, 68.16; H, 6.41.

(+)-(*R*)-2-(2-Fluoro-phenyl)-4-phenyl 4,5-dihydro-oxazole (*ent*-**6c**). According to general procedure VII: 95 % yield; colorless oil. TLC: R_f = 0.27 (PE/ethyl acetate 4:1). $[\alpha]_D^{20}$ = + 19.7 (c = 3.02, CH_3OH). ^{1}H NMR: δ = 4.24 (t, 1H, J = 8.2 Hz, OCH_ACH_B), 4.75 (dd, 1H, J = 10.2 Hz, 8.2 Hz; OCH_ACH_B), 5.41 (dd, 1H, J = 10.2 Hz, 8.2 Hz, CHN), 7.11 - 7.47 (m, 8H, Ar-H), 7.96 - 8.02 (m, 1H, Ar-H). ^{13}C NMR: δ = 70.20 (d, CHN), 74.60 (t, OCH_2), 116.00 (d, $J_{C,F}$ = 11 Hz, C-1'), 116.76 (d, $J_{C,F}$ = 22 Hz, C-3'), 124.00 (d, $J_{C,F}$ = 4 Hz, C-5'), 126.75, 127.65, 128.77 (3d, C-Ar), 131.38 (d, $J_{C,F}$ = 2 Hz, C-6'), 133.09 (d, $J_{C,F}$ = 9 Hz, C-4'), 142.21 (s, C-Ar), 161.35 (d, $J_{C,F}$= 259 Hz, C-F), 161.69 (d, $J_{C,F}$ = 5 Hz, C=N). Anal. Calcd for $C_{15}H_{12}FNO$ (241.26): C, 74.67; H, 5.02; N, 5.81. Found. C, 74.75; H, 5.30; N, 5.96.

(-)-(*S*)-2-(2-Fluoro-phenyl)-4-methyl-4,5-dihydro-oxazole (**6j**). According to general procedure VII: 96 % yield; colorless oil (kugelrohr distillation: 17 mbar, 150 - 153 °C). TLC: R_f = 0.38 (PE/ethyl acetate 1:2). $[\alpha]_D^{20}$ = -77.2 (c = 2.89, $CHCl_3$). ^{1}H NMR: δ = 1.37 [d, J = 6.4 Hz, 3H, CH_3], 3.94 (dd, J = 7.7 Hz, 7.4 Hz, 1H, OCH_ACH_B), 4.34 - 4.46 (m, 1H, CHN), 4.49 (dd, J = 9.4 Hz, 7.7 Hz, 1H, OCH_ACH_B), 7.09 - 7.19 (m, 2H, Ar-H), 7.39 - 7.46 (m, 1H, Ar-H), 7.83 - 7.89 (m, 1H, Ar-H). ^{13}C NMR: δ = 21.38 (q, CH_3), 62.25 (d, CHN), 73.68 (t, OCH_2), 116.22 (s, $J_{C,F}$ = 10.7 Hz, C-1'), 116.64 (d, $J_{C,F}$ = 22.0 Hz, C-3'), 123.91 (d, $J_{C,F}$ = 3.8 Hz, C-Ar), 131.11 (d, $J_{C,F}$ = 1.7 Hz, C-5'), 132.77 (d, $J_{C,F}$ = 8.8 Hz, C-Ar), 160.21 (d, $J_{C,F}$ = 5.1 Hz, C=N), 161.18 (d, $J_{C,F}$ = 257.7 Hz, C-F). Anal. Calcd for $C_{10}H_{10}FNO$ (179.19): C, 67.03; H, 5.62. Found: C, 66.87; H, 5.76.

4-*tert*-Butyl-2-(2-fluoro-phenyl)-4,5-dihydro-oxazole (**6e**). **General Procedure VIII (Method E).** To a solution of 59.75 g (0.250 mol) of **9e** and 175 mL (1.25 mol, 5 equiv) of dry triethylamine in 750 mL of CH_2Cl_2 were added at rt 52 g (272 mmol, 1.08 equiv) of *p*-TsCl in one portion. The resulting solution was kept at reflux for 24 h. After addition of 5 mL of water the solution was heated to reflux for 1 h and subsequently extracted three times with water. The organic layer was dried over Na_2SO_4, filtered and evaporated under reduced pressure. The crude product was purified by means of bulb-to-bulb distillation (100 °C, 0.02 mmHg) yielding 52.26 g (94 %) of a yellowish oil. The residue of the distillation was purified by flash chromatography (silica gel, PE/ethyl acetate 3:2)

yielding 1.87g (3.1 %) of the starting material **9e**. Based on recovered amide, the total yield of **6e** was 98 %. ^{1}H NMR: δ = 0.96 [s, 9H, C(C*H*$_3$)$_3$], 4.07 (dd, *J* = 10.2 Hz, 7.7 Hz, 1H, OC*H*$_A$CH$_B$), 4.23 (dd, *J* = 8.6 Hz, 7.6 Hz, 1H, CHN), 4.34 (dd, *J* = 10.2 Hz, 8.7 Hz, 1H, OCH$_A$C*H*$_B$), 7.09 - 7.19 (m, 2H, Ar-H), 7.38 - 7.46 (m, 1H, Ar-H), 7.87 (dt, *J* = 7.4 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 25.85 [q, C(*C*H$_3$)$_3$], 34.00 [s, *C*(CH$_3$)$_3$], 68.59 (t, OCH$_2$), 76.25 (d, CHN), 116.57 (d, $J_{C,F}$ = 21.9 Hz, C-Ar), 123.85 (d, $J_{C,F}$ = 3.8 Hz, C-Ar), 131.22 (d, $J_{C,F}$ = 2.0 Hz, C-Ar), 132.59 (d, $J_{C,F}$ = 8.6 Hz, C-Ar), 160.20 (s, C=N), 161.11 (d, $J_{C,F}$ = 257.2 Hz, C-F). For elemental analysis and optical rotation, see below.

[(+)-(*S*,*S*)-2-(2-Fluoro-phenyl)-4,5-dihydro-oxazole-4-yl]-phenyl-methanol (*ent*-**6k**). According to general procedure VIII: 75 % yield; colorless crystals after recrystallization from ethyl acetate/hexane; mp 100.5 - 101.0 °C. [α]$_D^{20}$ = + 65.5 (c 1.035, CHCl$_3$). ^{1}H NMR: δ = 4.12 - 4.21 (m, 2H, OCH$_2$), 4.36 (br.s, 1H, OH), 4.59 - 4.63 (m, 2H, CHN, C*H*PhOH), 7.11 (m, 2H, Ar-H), 7.25 - 7.46 (m, 6H, Ar-H), 7.84 (m, 1H, Ar-H). ^{13}C NMR: δ = 69.10 (t, OCH$_2$), 73.00 (d, CHN), 76.85 (d, *C*HPhOH), 115.71 (d, $J_{C,F}$= 10.0 Hz, C-Ar), 116.68 (d, $J_{C,F}$ = 22.0 Hz, C-Ar), 124.01 (d, $J_{C,F}$ = 4.0 Hz, C-Ar), 127.15, 128.19, 128.51, 131.28 (d, C-Ar), 133.24 (d, $J_{C,F}$ = 9.0 Hz, C-Ar), 140.06 (d, C-Ar), 161.10 (d, $J_{C,F}$ = 258 Hz, C-F), 162.25 (d, $J_{C,F}$ = 5 Hz, C=N). Anal. Calc. for C$_{16}$H$_{14}$NFO$_2$ (271.10): C, 70.84; H, 5.20; N, 5.16. Found: C, 70.81; H, 5.31; N, 5.30.

(+)-(*R*)-2-(2-Fluoro-phenyl)-4-(1-isobutylsulfanyl-1-methyl-ethyl)-4,5-dihydro-oxazole (*ent*-**6l**). According to general procedure VIII: 84 % yield; colorless oil. TLC: R_f = 0.60 (PE/ethyl acetate 1:1). [α]$_D^{20}$ = + 5.5 (c = 2.05, CHCl$_3$). ^{1}H NMR: δ = 0.93 (d, *J* = 6.5 Hz, 3H, CH$_3$), 0.95 (d, *J* = 6.6 Hz, 3H, CH$_3$), 1.23 (s, 3H, CH$_3$), 1.45 (s, 3H, CH$_3$), 1.71 [septet, *J* = 6.7 Hz, 1H, C*H*(CH$_3$)$_2$], 2.47 (m, 2H, SCH$_2$), 4.34 - 4.55 (m, 3H, CHN, OCH$_2$), 7.08 - 7.18 (m, 2H, 3'-H, 4'-H), 7.39 - 7.46 (m, 1H, 4'-H), 7.85 (dt, *J* = 7.5 Hz, 1.8 Hz, 1H, 6'-H). ^{13}C NMR: δ = 22.19 (q, CH$_3$), 22.25 (q, CH$_3$), 23.2 (q, CH$_3$), 27.1 (q, CH$_3$), 29.1 [d, *C*H(CH$_3$)$_2$], 36.5 (t, SCH$_2$), 47.4 [s, *C*(CH$_3$)$_2$S], 69.4 (t, OCH$_2$), 75.4 (d, CHN), 116.3 (d, $J_{C,F}$ = 10.9 Hz, C-1'), 116.6 (d, $J_{C,F}$ = 22.8 Hz, C-3'), 123.9 (d, $J_{C,F}$ = 3.7 Hz, C-5'), 131.2 (d, $J_{C,F}$ = 1.7 Hz, C-6'), 132.8 (d, $J_{C,F}$ = 8.8 Hz, C-4'), 161.2 (d, $J_{C,F}$ = 257.8 Hz, C-2'), 161.3 (d, $J_{C,F}$ = 5.0 Hz, C=N). Anal. Calcd for C$_{16}$H$_{22}$NOS (295.41): C, 65.05; H, 7.51; N, 4.74; S, 10.85. Found: C, 65.16; H, 7.66; N, 4.84; S, 10.82.

(-)-(*S*)-Fluoro-*N*-[2-hydroxy-1-(1*H*-imidazol-4-ylmethyl) ethyl]-benzamide (**9m**). 7.00 g (24.0 mmol) of **12** and 4.00 g (36.0 mmol) of dry CaCl$_2$ were dissolved in 170 mL of dry ethanol and the solution was cooled to -20 °C. Then 2.73 g (72.09 mmol) of NaBH$_4$ were added in portions over a 6 hour period to give a milky suspension. After stirring for 24 h at -20 °C, conversion was complete. At 0 °C, 20 mL of methanol were added and the solution was stirred for additional 20 min. 20 mL of water were added and stirring was continued for one more hour. The solution was acidified with 2N HCl, stirred overnight at rt and neutralized with 2N NaOH. The solvent was removed *in vacuo* and the residue was flash filtered over a 1 cm pad of silica gel (chloroform/methanol 9:1). The solvent was again removed *in vacuo* and the residue (8.3 g) was purified by flash chromatography (chloroform/methanol 9:1) yielding 5.80 g (92 %) of a foam, that was crystallized from chloroform yielding colorless needles, mp 140.0 - 140.5 °C. [α]$_D^{20}$ = - 41.29 (c = 1.03, MeOH). ^{1}H NMR (CD$_3$OD): δ = 2.88 (dd, *J* = 14.9 Hz, 8.2 Hz, 1H, C*H*$_A$H$_B$-Imidazole), 3.00 (dd, *J* = 14.9 Hz, 6.1 Hz, 1H, CH$_A$*H*$_B$-Imidazole), 3.66 (d, *J* = 5.2 Hz, 2H, OCH$_2$), 4.36 - 4.43 (m, 1H, CHN), 6.97 (s, 1H, C=CH-N), 7.19 (dd, *J* = 11.1 Hz, 8.4 Hz, 1H, Ar-H), 7.25 (td, *J* = 7.5 Hz, 1.0 Hz, 1H, Ar-H), 7.51 (ddd, *J* = 15.5 Hz, 5.2 Hz, 1.9 Hz, 1H, Ar-H), 7.66 (td, *J* = 7.5 Hz, 1.8 Hz, 1H, Ar-H), 7.79 (s, 1H, N=CH-N). ^{13}C NMR (CD$_3$OD): δ = 28.10 (t, CH$_2$-Imidazole), 52.78 (d, CHN), 64.14 (t, OCH$_2$), 117.27 (d, $J_{C,F}$ = 23.0 Hz, 1H, C-3'), 118.24 (d, C=*C*H-N), 124.17 (d, $J_{C,F}$ = 14.0 Hz, C-1'), 125.70 (d, $J_{C,F}$ = 3.0 Hz, C-5'), 131.38 (d, $J_{C,F}$ = 2.0 Hz, C-6'), 133.24 (s, *C*=CH-N), 134.28 (d, $J_{C,F}$ = 9.0 Hz, C-4'), 135.28 (d, N=CH-

N), 161.24 (d, $J_{C,F}$ = 249.0 Hz, C-F), 167.04 (s, C=O). HRMS Calcd for $C_{13}H_{14}N_3O_2F$: 263.1070. Found: 263.1080.

(-)-(*S*)-2-(2-Fluorophenyl)-4-[1-(toluen-4-sulfonyl)-1*H*-imidazol-4-yl-methyl]-4,5-dihydro-oxazole (6m-ts). According to general procedure VIII, except that only 3 equiv of triethylamine were used: 64 % yield; colorless needles (ethyl acetate), mp 132.5 - 134.0 °C. TLC: R_f = 0.66 (chloroform/methanol 4:1). $[\alpha]_D^{20}$ = - 21.4, (c = 1.01, MeOH). ^{1}H NMR: δ = 2.42 (s, 3H, CH_3), 2.77 (dd, *J* = 14.8 Hz, 7.8 Hz, 1H, CH_AH$_B$-Imidazole), 3.06 (dd, *J* = 14.8 Hz, 5.0 Hz, 1H, CH$_A$$H_B$-Imidazole), 4.19 (dd, *J* = 8.6 Hz, 7.6 Hz, 1H, OCH_ACH$_B$), 4.41 (dd, *J* = 9.4 Hz, 8.6, 1H, OCH$_A$CH_B), 4.60 - 4.65 (m, 1H, CHN), 7.11 - 7.20 (m, 3H, Ar-H, C=CH-N), 7.29 (d, *J* = 8.4 Hz, 2H, Ar-H), 7.42-7.49 (m, 1H, Ar-H), 7.77 (d, *J* = 8.5 Hz, 2H, Ar-H), 7.82 (dd, *J* = 7.5 Hz, 2.0 Hz, 1H, Ar-H), 7.92 (s, 1H, N=CH-N). ^{13}C NMR: δ = 21.69 (q, CH_3), 33.85 (t, CH_2-Imidazole), 66.04 (d, CHN), 71.58 (t, OCH_2), 114.62 (d, C=*C*H-N), 116.05 (d, $J_{C,F}$ = 3.0 Hz, C-1'), 116.66 (d, $J_{C,F}$ = 28.0 Hz, C-3'), 123.93 (d, $J_{C,F}$ = 4.0 Hz, C-5'), 127.28, 130.35 (2d, C-Ar), 131.15 (d, $J_{C,F}$ = 2.0 Hz, C-6'), 132.88 (d, $J_{C,F}$ = 9.0 Hz, C-4'), 135.09 (s, *C*=CH-N), 136.22 (d, N=CH-N), 141.35, 146.09 (2s, C-Ar), 160.97 (d, $J_{C,F}$ = 5.0 Hz, C=N), 161.17 (d, $J_{C,F}$ = 258.0 Hz, C-F). Anal. Calcd for $C_{20}H_{18}N_3O_3SF$ (399.47): C, 60.14; H, 4.54; N, 10.52; S, 8.03. Found: C, 60.16; H, 4.66; N, 10.52; S, 8.11.

(*S*)-2-(2-Fluorophenyl)-4-(1*H*-imidazol-4-yl-methyl)-4,5-dihydro-oxazole (6m). A solution of 2.0 g (5.00 mmol) of **6m-ts** and 230.0 mg (5.73 mmol) of NaOH in 50 mL of dry methanol was heated to reflux. After 1 h, TLC monitoring indicated that conversion was complete [R_f = 0.11 - 0.26 (tailing), chloroform/methanol 7:3]. The solvent was removed *in vacuo* and the residue was flash filtered (chloroform/methanol 9:1) over a pad of 1cm of silica gel to remove insoluble salts. The crude product was purified by flash chromatography (chloroform/methanol 9:1) to give 65 % yield, a colorless oil. ^{1}H NMR (CD_3OD): δ = 2.82 (dd, *J* = 14.6 Hz, 7.8 Hz, 1H, CH_AH$_B$-Imidazole), 3.07 (dd, *J* = 14.7 Hz, 5.0 Hz, 1H, CH$_A$$H_B$-Imidazole), 4.24 (dd, *J* = 8.5 Hz, 7.2 Hz, 1H, OCH_ACH$_B$), 4.45 (dd, *J* = 9.5 Hz, 8.6 Hz, 1H, OCH$_A$CH_B), 4.58 - 4.65 (m, 1H, CHN), 6.89 (s, 1H, C=CH-N), 7.19 - 7.27 (m, 2H, Ar-H), 7.54 (ddd, *J* = 15.6 Hz, 5.0 Hz, 1.9 Hz, 1H, Ar-H), 7.59 (m, 1H, N=CH-N), 7.79 (dd, *J* = 7.8 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR (CD_3OD): δ = 33.53 (t, CH_2-Imidazole), 67.37 (d, CHN), 72.89 (t, OCH_2), 116.90 (d, $J_{C,F}$ = 11.0 Hz, C-1'), 117.65 (d, $J_{C,F}$ = 22.0 Hz, C-3'), 118.83 (bd, C=*C*H-N), 125.38 (d, $J_{C,F}$ = 4.0 Hz, C-5'), 132.01 (d, $J_{C,F}$ = 3.0 Hz, C-6'), 134.58 (bs, *C*=CH-N), 134.73 (d, $J_{C,F}$ = 9.0 Hz, C-4'), 136.24 (d, N=CH-N), 162.41 (d, $J_{C,F}$ = 260.0 Hz, C-F), 163.22 (d, $J_{C,F}$ = 5.0 Hz, C=N). HRMS Calcd for $C_{13}H_{12}FN_3O$: 245.0964. Found: 245.0944.

(+)-(*S*)-N-(2-Hydroxy-1-hydroxymethyl-2,2-dimethyl-ethyl)-2-fluoro-benzamide (13a). A Grignard reagent solution was pepared from magnesium (1.82 g, 75.0 mmol), iodomethane (10.7 g, 75.0 mmol) and 60 mL of dry ether. The solution was dropwise added within 60 min at 0 °C *via* transfer *cannula* to a solution of **9n** (5.2 g, 21.5 mmol) in 70 mL of dry THF. After stirring overnight at rt, the reaction was quenched with NH_4Cl solution. The layers were separated and the aqueous layer was extracted twice with ethyl acetate. The combined organic phases were extracted with brine, dried over $MgSO_4$, filtered, and the solvents were removed *in vacuo*. The residue was purified by flash chromatography [silica gel, chloroform/methanol = 50:1, R_f (**13a**) = 0.13] to yield 3.2 g (65 %) of a colorless oil. $[\alpha]_D^{20}$ = +31.0 (c = 4.4, $CHCl_3$). ^{1}H NMR: δ = 1.22 (s, 3H, CH_3), 1.35 (s, 3H, CH_3), 3.60 [s, C(CH_3)$_2$O*H*, H/D exchange], 3.76 (t, *J* = 4.5 Hz, 1H, *H*OCH_2, H/D exchange), 3.84 - 3.97 (m, 2H, OCH_2), 4.02 - 4.08 (dt, *J* = 11.0 Hz, 3.3 Hz, 1H, CHN), 7.04 (dtd, *J* = 11.9 Hz, 7.5 Hz, 0.9 Hz, 1H, Ar-H), 7.18 (td, *J* = 7.5 Hz, 0.9 Hz, 1H, Ar-H), 7.37 - 7.44 (m, 1H, Ar-H), 7.53 - 7.60 (m, 1H, NH, H/D exchange), 7.94 (td, *J* = 7.7 Hz, 1.9 Hz, 1H, Ar-H). ^{13}C NMR: δ = 27.48 (q, CH_3), 57.18 (d, CHN), 62.97 (t, HOCH_2), 73.18 [s, *C*(CH_3)$_2$], 116.15 (d, $J_{C,F}$ = 24.5 Hz, C-Ar), 121.20 (d, $J_{C,F}$ = 11.4 Hz, C-1'),

124.69 (d, $J_{C,F}$ = 3.3 Hz, C-Ar), 131.69 (d, $J_{C,F}$ = 2.0 Hz, C-Ar), 133.22 (d, $J_{C,F}$ = 8.6 Hz, C-Ar), 160.58 (d, $J_{C,F}$ = 248.4 Hz, C-F), 163.90 (d, $J_{C,F}$ = 2.9 Hz, C=O). Anal. Calcd for $C_{12}H_{16}FNO_3$ (241.26): C, 59.74; H, 6.69; N, 5.81. Found: C, 59.75; H, 6.77; N, 6.03.

(+)-(*S*)-2-(2-Fluoro-phenyl)-4-(1-hydroxyl-1-methyl-ethyl)-4,5-dihydro-oxazole (*ent*-**6n**). According to general procedure VIII: 84 % yield; yellowish oil. TLC: R_f = 0.11, PE/ethyl acetate 2:1. $[\alpha]_D^{20}$ = + 60.0 (c = 0.25, $CHCl_3$). ^{1}H NMR: δ = 1.20 (s, 3H, CH_3), 1.35 (s, 3H, CH_3), 2.05 (bs, OH H/D exchange), 4.23 - 4.45 (m, 3H, OCH_2, CHN), 7.09 - 7.20 (m, 2H, Ar-H), 7.41 - 7.48 (m, 1H, Ar-H), 7.87 (td, *J* = 7.4 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 25.18 (q, CH_3), 26.68 (q, CH_3), 68.58 (t, OCH_2), 71.57 [s, $C(CH_3)_2$], 75.88 (d, CHN), 115.92 (d, C-1'), 116.70 (d, $J_{C,F}$ = 21.7 Hz, C-Ar), 123.93 (d, $J_{C,F}$ = 3.9 Hz, C-Ar), 131.20 (d, $J_{C,F}$ = 1.6 Hz, C-Ar), 133.00 (d, $J_{C,F}$ = 8.6 Hz, C-Ar), 161.19 (d, $J_{C,F}$ = 257.9 Hz, C-F), 161.80 (d, C=N). Anal. Calcd for $C_{12}H_{14}FNO_2$ (223.24): C, 64.56; H, H, 6.27; N, 6.32. Found: C, 64.46; H, 6.20; N, 6.54.

2-(2-Diarylphosphinophenyl)-oxazolines with Nonstereogenic Phosphorus

2-(2-Diphenylphosphino-phenyl)-4,5-dihydro-oxazole (**1a**). **General Procedure IX (Method F).** The requisite diphenylphosphine was prepared from triphenylphosphine by reaction with metallic lithium.[25] To a degassed solution of 1.10 g (5.90 mmol) of diphenylphosphine in 6 mL of dry THF was added dropwise at - 78 °C a degassed solution of 0.9 mmol of *n*-BuLi in *n*-hexane. After addition was complete, the cooling bath was removed and the solution was stirred for an additional hour. In a second flask, a solution of 680 mg (4.11 mmol) of **6a** in 6 mL of dry THF was cooled to -78 °C. To this solution the red solution of lithium diphenylphosphide was dropped by syringe. After addition was complete, the reaction mixture was allowed to warm to -20 °C. The mixture was kept at this temperature for 2 h and then stirred overnight at rt. Excess diarylphosphine was hydrolyzed by addition of $Na_2SO_4 \cdot 10H_2O$. After filtration over silica gel, the solvent was removed *in vacuo*. The residue was purified by flash chromatography [180 g of silica gel, PE/ethyl acetate 50:50, R_f (**1a**) = 0.30]. Recrystallization (*n*-hexane) gave 1.00 g (83 %) of colorless crystals, mp 103.0 - 104.5 °C. ^{1}H NMR: δ = 3.78 (dd, *J* = 9.3 Hz, 2H, CH_2N), 4.08 (dd, *J* = 9.3 Hz, 2H, OCH_2), 6.87 - 6.92 (m, 1H, Ar-H), 7.26 - 7.39 (m, 12H, Ar-H), 7.83 - 7.87 (m, 1H, Ar-H). ^{13}C NMR: δ = 54.92 (t, CH_2N), 67.17 (t, OCH_2), 128.00, 128.36, 128.46, 128.61, 129.79, 129.83, 130.41 (d, C-Ar), 131.96 (d, $J_{C,P}$ = 19.0 Hz, C-1'), 133.68, 133.70, 133.94, 134.21 (d, C-Ar), 137.98 (d, $J_{C,P}$ = 11.3 Hz, C-Ar), 139.03 (d, $J_{C,P}$ = 24.9 Hz, C-2'), 164.50 (d, $J_{C,P}$ = 2.6 Hz, C=N).^{31}P NMR ($CDCl_3$, 36.19 MHz): δ = - 5.7. Anal. Calcd for $C_{21}H_{18}NOP$ (331.35): C, 76.12; H, 5.48; N, 4.23; P, 9.35. Found: C, 75.96; H, 5.60; N, 4.26; P, 9.27.

2-(2-Diphenylphosphino-phenyl)-4,4-dimethyl-4,5-dihydro-oxazole (**1b**). According to general procedure IX: 41 % yield; colorless crystals (*n*-hexane), mp 103.0 - 104.0 °C. TLC: R_f= 0.29 (PE/ethyl acetate 3:1). ^{1}H NMR: δ = 1.05 (s, 6H, CH_3), 3.74 (s, 2H, OCH_2), 6.80 - 6.84 (m, 2H, Ar-H), 7.24 - 7.38 (m, 1H, Ar-H), 7.84 - 7.88 (m, 1H, Ar-H). ^{13}C NMR: δ = 27.95 (q, CH_3), 67.61 [s, $C(CH_3)_2$], 78.85 (t, OCH_2), 127.91, 128.43, 128.52, 128.69, 130.06, 130.10, 130.37 (d, C-Ar), 132.07 (d, $J_{C,P}$ = 18.1 Hz, C-1'), 133.33, 133.36, 134.05, 134.33 (d, C-Ar), 137.89 (d, $J_{C,P}$ = 11.3 Hz, C-Ar), 138.71 (d, $J_{C,P}$ = 24.9 Hz, C-2'), 162.40 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 6.1. Anal. Calcd for $C_{23}H_{22}NOP$ (359.41): C, 76.86; H, 6.17; N, 3.90; P, 8.62. Found: C, 77.05; H, 6.26; N, 4.05; P, 8.61.

(-)-(*S*)-2-(2-Diphenylphosphino-phenyl)-4-methyl-4,5-dihydro-oxazole (1c). According to general procedure IX: 76 % yield; yellowish oil. TLC: R_f = 0.23 (PE/ethyl acetate 3:1). $[\alpha]_D^{20}$ = - 7.2 (c = 3.52, $CHCl_3$). ^1H NMR: δ = 0.95 [d, *J* = 6.4 Hz, 3H, CH_3], 3.55 (dd, *J* = 7.4 Hz, 7.0 Hz, 1H, OCH_AH_B), 4.06 - 4.18 (m, 1H, CHN), 4.20 (dd, *J* = 9.2 Hz, 7.4 Hz, 1H, OCH_AH_B), 6.82 - 6.86 (m, 1H, Ar-H), 7.25 - 7.46 (m, 12H, Ar-H), 7.84 - 7.89 (m, 1H, Ar-H). ^{13}C NMR: δ = 20.81 (q, CH_3), 62.03 (d, CHN), 73.66 (t, OCH_2), 127.94, 128.36, 128.45, 128.54, 128.57, 128.72, 129.94, 129.98, 130.42 (d, C-Ar), 131.81 (d, $J_{C,P}$ = 18.1 Hz, C-1'), 133.49, 133.52, 133.82, 134.10, 134.22, 134.51 (d, C-Ar), 137.98 (d, $J_{C,P}$ = 11.3 Hz, C-Ar), 138.95 (d, $J_{C,P}$ = 24.9 Hz, C-2'), 163.45 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 6.3. Anal. Calcd for $C_{22}H_{20}NOP$ (345.38): C, 76.51; H, 5.84; N, 4.06; P, 8.97. Found: C, 76.74; H, 5.92; N, 4.23; P, 9.04.

(-)-(*S*)-2-(2-Diphenylphosphanyl-phenyl)-4-isopropyl-oxazoline (1d). According to general procedure IX: 67 % yield; colorless needles, mp 84.0 - 85.0 °C. TLC: R_f = 0.35 (hexane/ethyl acetate 4:1). $[\alpha]_D^{20}$ = - 35.4 (CH_2Cl_2, c = 1.20). ^1H NMR: δ = 0.72, 0.83 [2d, *J* = 6.7 Hz, 6H, $CH(CH_3)_2$], 1.48 [dqq, 1H, $CH(CH_3)_2$, *J* = 6.7 Hz], 3.82 - 3.92 (m, 2H, OCH_2), 4.10 - 4.20 (m, 1H, CHN), 6.86 - 7.93 (m, 14H, Ar-H). ^{13}C NMR: δ = 18.4, 18.9 [2q, $CH(CH_3)_2$], 32.8 (d, $CH(CH_3)_2$], 70.1 (t, OCH_2), 73.2 (d, CHN), 127.7 - 130.3(d, C-Ar), 132.0, 132.2 (s, C-Ar), 133.6 - 134.5 (d, C-Ar), 138.1, 139.1 (s, C-Ar), 163.0 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.02 MHz): δ = - 7.38. Anal. Calcd for $C_{24}H_{24}NOP$ (373.44): C, 77.19; H, 6.48; N, 3.75; P, 8.29. Found: C, 77.24; H, 6.59; N, 3.87; P, 8.15.

(-)-(*R*)-2-(2-Diphenylphosphino-phenyl)-4-phenyl-4,5-dihydro-oxazole (*ent*-**1e**). According to general procedure IX: 65 % yield; colorless crystals. Mp 118.0 - 119.0 °C. TLC: R_f = 0.50 (PE/ethyl acetate 7:3). $[\alpha]_D^{20}$ = - 28.1 (c = 1.43, $CHCl_3$). ^1H NMR: δ = 3.94 (t, *J* = 8.6 Hz, 1H, OCH_AH_B), 4.56 (dd, *J* = 9.9 Hz, 8.6 Hz, 1H, OCH_AH_B), 5.23 (dd, *J* = 9.6 Hz, 1H, CHN), 6.91 - 6.94 (m, 3H, Ar-H), 7.20 - 7.41 (m, 15H, Ar-H), 8.00 - 8.04 (m, 1H, Ar-H). ^{13}C NMR: δ = 70.19 (d, CHN), 74.39 (t, OCH_2), 126.68 - 130.70 (d, C-Ar), 131.49, 131.74 (s, C-Ar), 133.80 - 134.52 (d, C-Ar), 137.86 - 142.08 (s, C-Ar), 164.70 (d, J_{C-P} = 2.6 Hz, C=N). ^{31}P NMR($CDCl_3$, 81.02 MHz): δ = - 5.4. Anal. Calcd for $C_{27}H_{22}NOP$ (407.45): C, 79.58; H, 5.45; N, 3.44; P, 7.61. Found: C, 79.34; H, 5.68; N, 3.44; P, 7.51.

(+)-(*S*)-2-(2-Diphenylphosphino-phenyl)-4-benzyl-4,5-dihydro-oxazole (1f). According to general procedure IX: 22 % yield; colorless, highly viscous oil. $[\alpha]_D^{20}$ = + 24.1 (c = 1.49, $CHCl_3$). ^1H NMR: δ = 2.10 (dd, *J* = 13.8 Hz, 9.3 Hz, 1H, CH_AH_BPh), 2.92 (dd, *J* = 13.8 Hz, 5.0 Hz, 1H, CH_AH_BPh), 3.76 (m, 1H, OCH_AH_B), 4.04 (m, 1H, OCH_AH_B), 4.30 - 4.37 (m, 1H, CHN), 6.85 - 6.88 (m, 1H, Ar-H), 7.06 - 7.08 (m, 2H, Ar-H), 7.16 - 7.37 (m, 15H, Ar-H), 7.85 - 7.89 (m, 1H, Ar-H). ^{13}C NMR: δ = 41.15 (t, CH_2Ph), 67.98 (d, CHN), 71.50 (t, OCH_2), 126.31, 127.96, 128.39, 128.45, 128.56, 128.59, 128.75, 129.10, 129.94, 129.97, 130.51, 133.56, 133.59, 133.76, 134.03, 134.29, 134.57 (d, C-Ar), 131.63 (d, $J_{C,P}$ = 18.1 Hz, C-2'), 137.87 (s, C-Ar), 138.13 (2d, $J_{C,P}$ = 16.9 Hz, Ph_2P-*C*), 138.94 (d, $J_{C,P}$ = 25.3 Hz, C-1'), 163.87 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.02 MHz): δ = - 4.7. Anal. Calcd for $C_{28}H_{24}NOP$ (421.48): C, 79.79; H, 5.74; N, 3.32; P, 7.35. Found: C, 79.91; H, 5.83; N, 3.46; P, 7.27.

(-)-(*S*)-4-*tert*-Butyl-2-(2-diphenylphosphino-phenyl)-4,5-dihydro-oxazole (1g). According to general procedure IX: 56 % yield; colorless needles. Mp 114.0 - 115.0 °C. TLC: R_f = 0.35 (PE/ethyl acetate 9:1). $[\alpha]_D^{20}$ = - 61.9 (c = 1.755, $CHCl_3$). ^1H NMR: δ = 0.74 [s, 9H, $C(CH_3)_3$], 3.88 (dd, *J* = 10.2 Hz, 8.1 Hz, 1H, OCH_AH_B), 4.01 (t, *J* = 8.2 Hz, CHN), 4.09 (dd, *J* = 10.2 Hz, 8.2 Hz, 1H, OCH_AH_B), 6.86 - 6.89 (m, 1H, Ar-H), 7.18-7.40 (m, 12H, Ar-H), 7.90 - 7.96 (m, 1H, Ar-H). ^{13}C NMR: δ = 25.8 [q, $C(CH_3)_3$], 33.6 [s, $C(CH_3)_3$, 68.3 (t, OCH_2), 76.8 (d, CHN), 128.1 - 139.0 (C-Ar), 162.7 (d, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 6.0. Anal. Calcd for $C_{25}H_{26}NOP$ (387.46): C, 77.50; H, 6.76; N, 3.62; P, 7.99. Found: C, 77.50; H, 6.72; N, 3.77; P, 7.98.

(-)-(*S*)-2-(2-Diphenylphosphinophenyl)-4-(1*H*-imidazol-4-yl-methyl)-4,5-dihydro-oxazole (1h). According to general procedure IX, except that the solution of the starting material **6m** was initially treated with 1 equiv of sodium hydride: 47 % yield; colorless glass. $[\alpha]_D^{20}$ = - 15.9 (c = 1.2, MeOH). ^{1}H NMR (CD_3OD): δ = 2.50 (dd, *J* = 14.7 Hz, 7.7 Hz, 1H, C*H*$_A$H$_B$-Imidazole), 2.85 (dd, *J* = 14.7 Hz, 5.8 Hz, 1H, CH$_A$*H*$_B$-Imidazole), 3.88 (dd, *J* = 8.3 Hz, 7.6 Hz, 1H, OC*H*$_A$CH$_B$), 4.18 (dd, *J* = 9.4 Hz, 8.5 Hz, 1H, OCH$_A$C*H*$_B$), 4.26 - 4.36 (m, 1H, CHN), 6.78 (s, 1H, C=CH-N), 6.88 (dd, *J* = 7.5 Hz, 4.2 Hz, 1H, Ar-H), 7.25 - 7.45 (m, 12H, Ar-H), 7.58 (s, 1H, N=CH-N), 7.75 (dd, *J* = 7.5 Hz, 3.4 Hz, 1H, Ar-H). ^{13}C NMR (CD_3OD): δ = 30.86 (t, CH_2-Imidazole), 66.92 (d, CHN), 71.47 (t, OCH_2), 128.46 - 128.89 (d, C-Ar), 129.77 (d, $J_{C\text{-}P}$ = 2.8 Hz, C-Ar), 130.90 (s, C-Ar), 131.46 (d, $J_{C\text{-}P}$ = 19.2 Hz, C-1'), 133.88 (d, $J_{C\text{-}P}$ = 19.8 Hz, C-Ar), 133.96 (d, $J_{C,P}$ = 20.2 Hz, C-Ar), 134.48, 134.96 (2d, C-Ar), 137.50 (d, $J_{C\text{-}P}$ = 9.1 Hz, C-Ar), 138.02 (d, $J_{C\text{-}P}$ = 10.2 Hz, C-Ar), 138.14 (d, $J_{C\text{-}P}$ = 9.6 Hz, C-Ar), 138.53 (s, *C*=CH-N), 163.30 (d, $J_{C\text{-}P}$ = 3.4 Hz, C=N). ^{31}P NMR ($CDCl_3$, 81.02 MHz): δ = - 8.2. HRMS Calcd for $C_{24}H_{22}N_3OP$: 411.1487. Found: 411.1501.

(+)-(*S*)-2-(2-diphenylphosphino-phenyl)-4-(1-indolylmethyl)-4,5-dihydro-oxazole (1i). According to general procedure IX , except that 2.1 equiv of lithium diphenylphoshide were used: 85 % yield; colorless glass. TLC: R_f = 0.27, PE/ethyl acetate 7:3). $[\alpha]_D^{20}$ = +17.9 (c = 2.35, EtOH). ^{1}H NMR: δ = 2.28 (dd, *J* = 14.6 Hz, 9.4 Hz, 1H, C*H*$_A$H$_B$-Indolyl), 3.03 (dd, *J* = 14.5 Hz, 4.5 Hz, 1H, CH$_A$*H*$_B$-Indolyl), 3.81 (t, *J* = 8.2 Hz, 1H, OC*H*$_A$H$_B$), 4.04 (t, *J* = 8.5 Hz, 1H, OCH$_A$*H*$_B$), 4.44 - 4.51 (m, 1H, CHN=), 6.80 (d, *J* = 2.1 Hz, 1H, Ar-H), 6.85 - 6.92 (m, 1H, Ar-H), 7.07 - 7.22 (m, 3H, Ar-H), 7.24 - 7.42 (m, 12H, Ar-H), 7.55 (dd, *J* = 6.9 Hz, 1.4 Hz, 1H, Ar-H), 7.87 - 7.93 (m, 1H, NHC*H*=), 8.20 (s, 1H, NH). ^{13}C NMR: δ = 30.75 (t, CH_2-Indolyl), 66.97 (d, CHN=), 72.02 (t, OCH_2), 111.06 (d, NH*C*H=C), 112.09 (s, CH=*C*), 118.91 (d, C-Ar), 122.05 (d, C-Ar), 127.94, 128.32, 128.40, 128.47, 128.55, 128.72, 129.87 (d, C-Ar), 130.19 (d, C-Ar), 131.69 (d, C-Ar), 133.51 (d, C-Ar), 133.84 (d, C-Ar), 134.08 (d, C-Ar), 136.11 (s, C-2'), 137.71 (d, C-Ar), 137.94 (d, C-Ar), 138.78 (d, C-Ar), 163.84 (s, C=N). ^{31}P NMR: δ = - 4.74. HRMS Calcd for $C_{28}H_{25}N_2OP$: 460.1705. Found: 460.1706.

(*S,S*)-2-(2-Fluoro-phenyl)-4-[phenyl(tetrahydropyran-2-yloxy)methyl]-4,5-dihydro-oxazole (*ent*-**6o**, mixture of diastereomers). Alcohol *ent*-**6k** (1.00 g, 3.69 mmol) was dissolved in dry CH_2Cl_2 (5 mL). After the addition of a catalytic amount of *p*-TsOH (40 mg) and dihydropyran (1.68 mL, 18.41 mmol), the solution was heated to reflux overnight. According to TLC (silica gel, Et_2O) the starting material was completely consumed. The product was purified by flash column chromatography (silica gel, ethyl acetate/hexane 40:60), yielding the product (1.29 g, 96 %) as a highly viscous oil. ^{1}H NMR (200 MHz): δ = 1.41 - 1.93 (m, 6H), 3.25 - 3.55, 3.95 - 4.09 (2m, 2H), 4.12 - 4.37 (m, 2H), 4.54 - 5.13 (5 x m, 3H), 7.06 - 7.44 (m, 8H, Ar-H), 7.73 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.97 (t, CH_2), 19.16 (t, CH_2), 25.32 (t, CH_2), 25.41 (t, CH_2), 30.43 (t, CH_2), 30.49 (t, CH_2), 61.96 (t, OCH_2), 62.15 (t, OCH_2), 68.37 (t, OCH_2), 71.06 (d, *C*HOTHP), 71.12 (d, *C*HOTHP), 77.78 (d, CHN), 78.84 (d, CHN), 95.70 (d, OCHO), 98.32 (d, OCHO), 115.96 (d, $J_{C,F}$ = 10.8 Hz, C-Ar), 116.31 (d, $J_{C,F}$ = 10.8 Hz, C-Ar), 116.43 (d, $J_{C,F}$ = 21.8 Hz, C-Ar), 116.48 (d, $J_{C,F}$ = 21.8 Hz, C-Ar), 123.69 (d, $J_{C,F}$ = 3.5 Hz, C-Ar), 123.75 (d, $J_{C,F}$ = 3.5 Hz, C-Ar), 127.30, 127.48, 127.78, 127.90, 127.95, 128.64 (d, C-Ar), 130.98 (d, $J_{C,F}$ = 1.9 Hz, C-Ar), 131.02 (d, $J_{C,F}$ = 1.9 Hz, C-Ar), 132.62 (d, $J_{C,F}$ = 8.7 Hz, C-Ar), 132.72 (d, $J_{C,F}$ = 8.6 Hz, C-Ar), 137.51 (s, C-Ar), 138.65 (s, C-Ar), 161.04 (d, $J_{C,F}$ = 256 Hz, C-Ar), 161.54 (d, $J_{C,F}$ = 2.9 Hz, C=N).

2-(2-Diphenylphosphinophenyl)-4-[phenyl(tetrahydropyran-2-yloxy)methyl]-4,5-dihydro-oxazole (*ent*-**1j**). According to general procedure IX: 76 % yield, colorless oil, as a mixture of diastereomers. ^{1}H NMR: δ = 1.31 - 1.94 (m. 6H, $CH_2CH_2CH_2$), 3.28 - 4.12 (m, 4H, OCH_2, O*C*H_2CH), 4.56 (m, 2H, CHN, *C*HPhOTHP), 4.83 - 5.07 (m, 1H, OCHO), 6.93 (m, 1H, Ar-H), 7.17 - 7.42 (m, 17H, Ar-H),

7.77 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.98 (t, CH_2), 19.33 (t, CH_2), 25.54 (t, CH_2), 25.60 (t, CH_2), 30.68 (t, CH_2), 61.68 (t, OCH_2CH), 62.29 (t, OCH_2CH), 68.55 (t, OCH_2), 68.66 (t, OCH_2), 71.20 (d, CHN), 71.84 (d, CHN), 77.92 (d; CHOTHP), 79.82 (d, CHOTHP), 95.69 (d, OCHO), 98.43 (d, OCHO), 127.47, 127.57, 127.77, 127.97, 128.01, 128.04, 128.10, 128.43, 128.53, 128.66 (d, C-Ar), 129.90 (d, $J_{C,P}$ = 3 Hz, C-Ar), 129.97 (d, $J_{C,P}$ = 3 Hz, C-Ar), 130.40, 130.51 (d, C-Ar), 132.19 (d, $J_{C,P}$ = 20 Hz, C-Ar), 132.32 (d, $J_{C,P}$ = 20 Hz, C-Ar), 133.77, 133.88 (d, C-Ar), 134.08 (d, $J_{C,P}$ = 20 Hz, C-Ar), 134.21 (d, $J_{C,P}$ = 21 Hz, C-Ar), 137.86 (s, C-Ar), 138.05 (d, $J_{C,P}$ = 20 Hz, C-Ar), 138.21 (d, $J_{C,P}$ = 22 Hz, C-Ar), 138.82 (d, $J_{C,P}$ = 25 Hz, C-Ar), 138.88 (d, $J_{C,P}$ = 25 Hz, C-Ar), 139.43 (s, C-Ar), 164.76 (s, C=N), 164.94 (s, C-Ar). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 6.03. HRMS: Calcd for $C_{33}H_{32}NO_3P$: 521.2119. Found: 521.2104.

[(S,S)-2-(2-Diphenylphosphino-phenyl)-4,5-dihydrooxazol-4-yl]-phenyl-methanol (*ent*-**1t**). The phosphine *ent*-**1j** (100 mg, 0.22 mmol) was dissolved in methanol (20 mL). Ion-exchange resin Amberlyst-15 (25 mg) was added and the solution was heated to reflux for 6 h. The resin was filtered off, and the solvent was evaporated under reduced pressure. The residue was purified by flash column chromatography (silica gel, Et_2O/*n*-hexane 50:50) yielding 28.3 mg (34 %) of a colorless oil. ^{1}H NMR: δ = 2.94 (br.s, 1H, OH), 4.01 (m, 1H), 4.14 (m, 2H), 4.48 (dt, *J* = 9.6 Hz, 7.5 Hz, 1H), 6.96 (m, 1H, Ar-H), 7.26-7.44 (m, 17H, Ar-H), 7.93 (m, 1H, Ar-H). ^{13}C NMR: δ = 69.47 (t, OCH_2), 73.54 (d, CHN), 77.42 (d, CHOH), 127.13, 128.07, 128.29, 128.52 (d, C-Ar), 128.59 (d, $J_{C,P}$ = 3.4 Hz, C-Ar), 128.68 (d, $J_{C,P}$ = 3.4 Hz, C-Ar), 129.72 (d, $J_{C,P}$ = 2.6 Hz, C-Ar), 130.86 (d, C-Ar), 131.55 (d, $J_{C,P}$ = 20.3 Hz, C-Ar), 133.49 (d, $J_{C,P}$ = 19.8 Hz, C-Ar), 134.23 (d, $J_{C,P}$ = 20.3 Hz, C-Ar), 134.46 (d, C-Ar), 137.97 (d, $J_{C,P}$ = 33.3 Hz, C-Ar), 138.10 (d, $J_{C,P}$ = 32.2 Hz, C-Ar), 140.21 (s, C-Ar), 164.36 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 6.36. HRMS: Calcd for $C_{28}H_{24}NO_2P$: 437.1544. Found: 437.1533.

(-)-(*S,S*)-2-(2-Diphenylphosphinophenyl)-4-(3,3,4,4-tetramethyl-2-oxa-3-sila-1-phenyl-pentyl)-4,5-dihydro-oxazole (*ent*-**1u**). Alcohol *ent*-**1t** (50 mg, 0.11 mmol) was dissolved in dry CH_2Cl_2 (1 mL) and at 0 °C collidine (48.5 mg, 3.5 equiv) and *t*Bu(CH_3)$_2$SiOTf (60.4 mg, 2 equiv) were added. Stirring was continued at rt overnight. Water and CH_2Cl_2 were added and the water layer was extracted three times with CH_2Cl_2. The combined organic layers were dried over Na_2SO_4, filtered and evaporated under reduced pressure. The residue was purified by flash column chromatography (silica gel, CH_2Cl_2/*n*-hexane 75:25), yielding the product (59.7 mg, 95 %) as a white solid, mp 129.0 - 130.5 °C. $[\alpha]_D^{20}$ = - 19.6 (c = 1.045, CH_2Cl_2). ^{1}H NMR: δ = 0.08 (s, 3H, $SiCH_3$), 0.11 (s, 3H, $SiCH_3$), 0.90 [s, 9H, $SiC(CH_3)_3$]), 3.86 (dd, *J* = 9.9 Hz, 8.8 Hz, 1H, OCH_AH_B), 4.10 (dd, *J* = 8.8 Hz, 6.6 Hz, 1H, OCH_AH_B), 4.42 (ddd, *J* = 9.9 Hz, 6.6 Hz, 4.4 Hz, 1H, CHN), 4.83 (d, *J* = 4.41 Hz, 1H, CHOSi), 6.90 (m, 1H, Ar-H), 7.11 - 7.36 (m, 17H, Ar-H), 7.62 (m, 1H, Ar-H). ^{13}C NMR: δ = - 4.96 (q, $SiCH_3$), 4.71 (q, $SiCH_3$), 18.23 [s, $C(CH_3)_3$], 25.86 [q, $C(CH_3)_3$], 68.08 (t, OCH_2), 72.72 (d, CHOSi), 75.05 (d, CHN), 127.10, 127.70, 127.52, 127.95, 128.35, 128.45, 128.55, 128.61 (d, C-Ar), 129.73 (d, $J_{C,P}$ = 3.4 Hz, C-Ar), 130.26 (d, C-Ar), 132.27 (d, $J_{C,P}$ = 20.3 Hz, C-Ar), 133.72 (d, C-Ar), 134.09 (d, $J_{C,P}$ = 20.9 Hz, C-Ar), 134.19 (d, $J_{C,P}$ = 20.9 Hz, C-Ar), 138.00 (d, $J_{C,P}$ = 22.4 Hz, C-Ar), 138.15 (d, $J_{C,P}$ = 24.5 Hz, C-Ar), 138.74 (d, $J_{C,P}$ = 24.9 Hz, C-Ar), 140.00 (s, C-Ar), 164.79 (d, $J_{C,P}$ = 1.7 Hz, C-Ar). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 6.35 (s). Anal. Calcd for $C_{34}H_{38}NO_2PSi$ (551.24): C, 74.02; H, 6.94; N, 2.54; P, 5.61. Found: C, 74.26; H, 6.94; N, 2.69; P, 5.53.

(+)-(*S,S*)-4-(Benzyloxyphenylmethyl)-2-(2-fluoro-phenyl)-4,5-dihydro-oxazole (*ent*-**6p**). At 0 °C, NaH (44.8 mg, 1.84 mmol) and Bu_4NI (68 mg, 0.18 mmol) were added to a solution of *ent*-**6k** (0.50 g, 1.84 mmol) in dry THF (10 mL), followed by dropwise addition of 0.22 mL of benzyl bromide (1.84 mmol). Stirring was continued for 5 h at rt. After addition of CH_2Cl_2, the reaction mixture was extracted twice with water. The organic layer was dried over Na_2SO_4, filtered and the solvent evaporated under reduced

pressure, yielding a viscous yellow oil. After purification by flash column chromatography (silica gel, CH_2Cl_2), the product (441 mg, 66 %) was obtained as a colorless oil. $[\alpha]_D^{20}$ = + 24.3 (c 0.655, $CHCl_3$). ^1H NMR: δ = 4.25 (dd, *J* = 9.5 Hz, 8.8 Hz, 1H), 4.30 (dd, *J* = 8.8 Hz, 6.9 Hz, 1H), 4.40 (d, *J* = 12.5 Hz, 1H), 4.65 (d, *J* = 5.1 Hz, 1H), 4.68 (d, *J* = 12.5 Hz, 1H), 4.79 (ddd, *J* = 9.5 Hz, 6.9 Hz, 5.1 Hz, 1H), 7.12 (m, 2H, Ar-H), 7.35 (m, 11H, Ar-H), 7.74 (m, 1H, Ar-H). ^{13}C NMR: δ = 68.45 (t, OCH_2Ph), 70.73 (t, OCH_2), 71.23 (d, CHN), 81.62 (d, CHOBnz), 116.18 (s, $J_{C,F}$ = 11 Hz, C-Ar), 116.61 (d, $J_{C,F}$ = 22 Hz, C-Ar), 123.89 (d, $J_{C,F}$ = 9 Hz, C-Ar), 137.57 (s, C-Ar), 138.32 (s, C-Ar), 161.19 (s, $J_{C,F}$ = 258 Hz, C-F), 161.75 (s, $J_{C,F}$ = 5 Hz, C=N). Anal. Calcd for $C_{23}H_{20}FNO_2$ (361.15): C, 76.44; H, 5.58; N, 3.88. Found: C, 76.62; H, 5.72; N, 4.09.

(+)-(*S,S*)-4-(Benzyloxyphenylmethyl)-2-(2-diphenylphosphino-phenyl)-4,5-dihydro-oxazole (*ent*-**1k**). According to general procedure IX: 89 % yield, colorless solid, after recrystallization from ethyl acetate/hexane. Mp 128.0 - 128.5 °C. $[\alpha]_D^{19}$ = + 7.8 (c = 0.93, $CHCl_3$). ^1H NMR: δ = 3.88 (m, 2H, OCH_2), 4.30 (d, *J* = 5.8 Hz, 1H, CHN), 4.35 (d, *J* = 12.1 Hz, 1H, OCH_AH_BPh), 4.54 (m, 1H, CHOBnz), 4.56 (d, *J* = 12.1 Hz, 1H, OCH_AH_BPh), 6.90 (m, 1H, Ar-H), 7.34 (m, 22H, Ar-H), 7.75 (m, 1H, Ar-H). ^{13}C NMR: δ = 68.46 (t, OCH_2), 70.62 (t, CH_2Bnz), 71.26 (d, CHN), 81.99 (d, CHOBnz), 127.54, 127.79, 127.86 (d, C-Ar), 127.97 (d, $J_{C,P}$ = 1 Hz, C-Ar), 128.22, 128.34 (d, C-Ar), 128.44 (d, $J_{C,P}$ = 1 Hz, C-Ar), 128.53 (d, $J_{C,P}$ = 1 Hz, C-Ar), 128.67 (d, $J_{C,P}$ = 2 Hz, C-Ar), 130.03 (d, $J_{C,P}$ = 2 Hz, C-Ar), 130.47 (d, C-Ar), 131.97 (d, $J_{C,P}$ = 19 Hz, C-Ar), 133.65 (d, $J_{C,P}$ = 2 Hz, C-Ar), 134.12 (d, $J_{C,P}$ = 12 Hz, C-Ar), 134.25 (d, $J_{C,P}$ = 21 Hz, C-Ar), 137.71 (s, C-Ar), 137.90 (d, $J_{C,P}$ = 19 Hz, C-Ar), 138.06 (d, $J_{C,P}$ = 20 Hz, C-Ar), 138.42 (d, C-Ar), 138.80 (d, $J_{C,P}$ = 25 Hz, C-Ar), 165.00 ($J_{C,P}$ = 2 Hz, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = -5.74. Anal. Calcd for $C_{35}H_{30}NO_2P$ (525.20): C, 79.68; H, 5.73; N, 2.65; P, 5.87. Found: C, 79.42; H, 5.79; N, 2.80; P, 5.79.

(-)-(*S*)-2-(2-Diphenylphosphino-phenyl)-4-(2-methylsulfanyl-ethyl)-4,5-dihydro-oxazole(1l). According to general procedure IX: 77 % yield, a colorless, highly viscous oil. TLC: R_f = 0.35 (PE/ethyl acetate 7:3). $[\alpha]_D^{20}$ = - 50.9 (c = 2.12, $CHCl_3$). ^1H NMR (DMSO-d^6, 200.13 MHz, 310 K): δ = 1.32 - 1.64 (m, 2H, CH_2CH), 1.97 (s, 3H, SCH_3), 2.33 - 2.41 (m, 2H, SCH_2), 3.65-3.81 (m, 1H, OCH_AH_B), 4.05 - 4.20 (m, 1H, CHN), 4.29 (dd, *J* = 9.4 Hz, 7.8 Hz, 2H, OCH_AH_B), 6.79 - 6.86 (m, 1H, Ar-H), 7.12 - 7.24 (m, 4H, Ar-H), 7.30 - (m, 8H, Ar-H), 7.78 - 7.85 (m, 1H, Ar-H). ^{13}C NMR: δ = 15.5 (q, CH_3), 30.7 (t, CH_2CH),35.3 (t, SCH_2), 66.1 (d, CHN), 72.0 (t, OCH_2), 128.0-134.5 (d, C-Ar), 138,1 (d, $J_{C,P}$ = 4.6 Hz, C-Ar), 138.3 (d, $J_{C,P}$ = 6.9 Hz, C-Ar), 138.9 (d, $J_{C,P}$ = 25.4 Hz, C-Ar), 163.3 (d, $J_{C,P}$ = 2.7 Hz, C=N). ^{31}P NMR (81.0 MHz): δ = -6.9. Anal. Calcd for $C_{24}H_{24}NOPS$ (405.49): C, 71.09; H, 5.97; N, 3.45; S, 7.91; P, 7.64. Found: C, 71.22; H, 6.10; N, 3.65; S, 7.95; P, 7.44.

(-)-(*R*)-2-(2-Diphenylphosphino-phenyl)-4-(1-isobutylsulfanyl-1-methyl-ethyl)-4,5-dihydro-oxazole (*ent*-**1m**). According to general procedure IX: 60 % yield; colorless, highly viscous oil. $[\alpha]_D^{20}$ = - 6.6 (c = 1.89, $CHCl_3$). ^1H NMR (200.13 MHz): δ = 0.84 [s, 3H, $SC(CH_3)_2$], 0.926 [d, *J* = 6.6 Hz, 3H], 0.933 (d, *J* = 6.6 Hz, 3H, $CH(CH_3)_2$), 1.23 [s, 3H, $SC(CH_3)_2$], 1.67 [septet, *J* = 6.6 Hz, 1H, $CH(CH_3)_2$], 2.29 (dd, *J* = 11.6 Hz, 6.6 Hz, 1H, SCH_AH_B), 2.37 (dd, *J* = 11.6 Hz, 6.9 Hz, 1H, SCH_AH_B), 4.15 - 4.27 (m, 2H, OCH_2), 4.32 (dd, *J* = 3.1 Hz, 1.7 Hz, 1H, CHN), 6.84 - 6.91 (m, 1H, Ar-H), 7.18 - 7.42 (m, 12H, Ar-H), 7.91 - 7.97 (m, 1H, Ar-H). ^{13}C NMR: δ = 22.1 [q, $CH(CH_3)_2$], 22.2 [q, $CH(CH_3)_2$], 27.2 (q, CH_3CS), 28.1 [d, $CH(CH_3)_2$], 29.0 (q, CH_3CS), 36.2 (t, SCH_2), 47.1 [s, $C(CH_3)_2S$], 69.2 (t, OCH_2), 75.4 (d, CHN), 128.1 - 139.2 (d and s, C-Ar), 163.7 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 6.3. Anal. Calcd for $C_{28}H_{32}NOPS$ (460.61): C, 72.86; H, 6.99; N, 3.03; S, 6.95; P, 6.71. Found: C, 73.01; H, 7.20; N, 3.03; S, 6.98; P, 6.72.

(-)-(*S*)-2-[2-Bis-naphthalen-1-yl-phosphino]-4-isopropyl-4,5-dihydro-oxazole (**1n**). According to general procedure IX: 65 % yield after recrystallization from acetonitrile; colorless platelets. Mp

165.0 - 167.0 °C. $[\alpha]_D^{20}$ = - 45.1 (c = 3.0, $CHCl_3$). ^1H NMR: δ = 0.51 [d, *J* = 6.7 Hz, 3H, CH(CH_3)$_2$], 0.56 [d, *J* = 6.5 Hz, 3H, CH(CH_3)$_2$], 1.27 - 1.30 [m, 1H, C*H*(CH$_3$)$_2$], 3.72 - 3.85 (m, 2H, CHN, OCH_AH$_B$), 4.05 (dd, *J* = 7.9 Hz, 7.3 Hz, 1H, OCH$_A$*H$_B$*), 6.88 - 6.92 (m, 1H, Ar-H), 7.03 - 7.16 (m, 2H, Ar-H), 7.18 - 7.20 (m, 1H, Ar-H), 7.26 - 7.52 (m, 8H, Ar-H), 7.82 - 7.89 (m, 3H, Ar-H), 7.93 - 7.97 (m, 1H, Ar-H), 8.53 - 8.62 (m, 2H, Ar-H). ^{13}C NMR: δ = 18.10 [q, CH(*C*H$_3$)$_2$], 18.5 [q, CH(*C*H$_3$)$_2$], 32.56 [d, *C*H(CH$_3$)$_2$], 70.09 (t, OCH$_2$); 73.05 (d, CHN), 125.73, 125.86, 126.10, 126.13, 126.42, 126.50, 126.81, 126.89, 128.30, 128.49, 129.23, 129.32, 130.04, 130.10, 130.50 (18d, Ar-C), 132.78, 133.43, 133.50, 133.57, 134.76, (4s, C-Ar), 134.91 (d, $J_{C,P}$ = 7.9 Hz, C-Ar), 135.73 (d, $J_{C,P}$ = 6.2 Hz, C-Ar), 136.06 (d, $J_{C,P}$ = 5.7 Hz, C-Ar), 137.55 (d, $J_{C,P}$ = 22.0 Hz, C-1'), 163.13 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = -25.1. Anal. Calcd for $C_{32}H_{28}NOP$ (473.55): C, 81.16; H, 5.96; N, 2.96; P, 6.54. Found: C, 80.95; H, 5.95; N, 3.23; P, 6.46.

(+)-(*S*)-2-(2-Dibenzophosphol-5-yl-phenyl)-4-isopropyl-4,5-dihydro-oxazole (1o). 5H-Dibenzophosphole was prepared by a procedure reported in ref.[37] According to general procedure IX: 41 % yield; colorless needles (acetonitrile). Mp 96.0 - 97.0 °C. TLC: R_f = 0.32 (PE/ethyl acetate 9:1). $[\alpha]_D^{20}$ = +100.0 (c = 1.29, $CHCl_3$). ^1H NMR: δ = 1.07 [d, *J* = 6.7 Hz, 3H, CH(CH_3)$_2$], 1.18 [d, *J* = 6.7 Hz, 3H, CH(CH_3)$_2$], 1.94 - 2.05 [m, 1H, C*H*(CH$_3$)$_2$], 4.12 - 4.40 (m, 2H, OCH_AH$_B$, CHN), 4.55 - 4.63 (m, 1H, OCH$_A$*H$_B$*), 6.74 - 6.78 (m, 1H, Ar-H), 7.06 - 7.11 (m, 1H, Ar-H), 7.26 - 7.36 (m, 3H, Ar-H), 7.43 - 7.50 (m, 2H, Ar-H), 7.81 - 7.86 (m, 1H, Ar-H), 7.90 - 7.99 (m, 3H, Ar-H), 8.03 - 8.07 (m, 1H, Ar-H). ^{13}C NMR: δ = 19.28 [q, CH(*C*H$_3$)$_2$], 19.31 [q, CH(*C*H$_3$)$_2$], 33.33 [d, *C*H(CH$_3$)$_2$, 70.96 (t, OCH$_2$), 74.03 (d, CHN), 121.21, 121.29, 127.19, 127.22, 127.27, 127.30, 128.37, 128.41, 128.60, 129.20, 129.26, 130.55, 131.00, 131.19, 131.27, 131.45, 131.77, 131.81 (d, C-Ar), 133.12, 133.47, 137.89, 138.80, 143.37, 143.43, 143.46, 143.50, 143.69, 143.73 (s, C-Ar). 163.17 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = - 17.6. Anal. Calcd for $C_{24}H_{22}NOP$ (371.42): C, 77.61; H, 5.97; N, 3.77; P, 8.34. Found: C, 77.39; H, 6.02; N, 3.78; P, 8.41.

(-)-(*S*)-2-{2-[Bis-(3,5-dimethyl-phenyl)-phosphino]-phenyl}-4-isopropyl-4,5-dihydro-oxazole (1p). According to general procedure IX: 45 % yield; colorless oil. $[\alpha]_D^{20}$ = - 37.1 (c = 3.0, $CHCl_3$). ^1H NMR: δ = 0.72 [d, *J* = 6.7 Hz, 3H, CH(CH_3)$_2$], 0.84 [d, *J* = 6.7 Hz, 3H, CH(CH_3)$_2$], 1.45 [septet, *J* = 6.7 Hz, 1H, C*H*(CH$_3$)$_2$], 2.23 (s, 6H, CH$_3$), 2.25 (s, 6H, CH$_3$), 3.76 - 3.89 (m, 2H, OCH_ACH$_B$, CHN), 4.05 - 4.15 (m, 1H, OCH$_A$C*H$_B$*), 6.85 - 6.96 (m, 6H, Ar-H), 7.24 - 7.35 (m, 3H, Ar-H), 7.82 - 7.89 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.35 [q, CH(*C*H$_3$)$_2$], 18.89 [q, CH(*C*H$_3$)$_2$], 21.29 (q, CH$_3$), 21.31 (q, CH$_3$), 32.76 [d, *C*H(CH$_3$)$_2$], 70.11 (t, OCH$_2$), 72.99 (d, CHN), 127.72 - 139.54 (d , C-Ar), 163.40 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.02 MHz): δ = - 4.9. Anal. Calcd for $C_{28}H_{32}NOP$ (429.56): C, 78.29; H, 7.51; N, 3.26; P, 7.21. Found: C, 78.27; H, 7.62; N, 3.41; P, 7.25.

(-)-(*S*)-2-(2-Di-*m*-tolyl-phosphino)-phenyl-4-isopropyl-4,5-dihydro-oxazole (1q). Di-*m*-tolyl-phosphine was prepared from tri-*m*-tolyl-phosphine following a procedure reported in ref.[25]. According to general procedure IX: 45 % yield; colorless oil. $[\alpha]_D^{20}$ = - 44.9 (c = 3.0, $CHCl_3$). ^1H NMR: δ = 0.71 [d, *J* = 6.8 Hz, 3H, CH(CH_3)$_2$], 0.82 [d, *J* = 6.8 Hz, 3H, CH(CH_3)$_2$], 1.47 [septet, *J* = 6.8 Hz, 1H, C*H*(CH$_3$)$_2$], 2.28, 2.29 (2s, 6H, 2CH$_3$), 3.79 - 3.91 (m, 2H, OCH_AH$_B$, CHN), 4.06 - 4.18 (m, 1H, OCH$_A$*H$_B$*), 6.68 - 6.90 (m, 1H, Ar-H), 7.04 - 7.36 (m, 10H, Ar-H), 7.86 - 7.90 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.38 [q, CH(*C*H$_3$)$_2$], 18.91 [q, CH(*C*H$_3$)$_2$], 21.41 (q, 2 Ar-CH$_3$), 21.45 (q, 2 Ar-CH$_3$), 32.76 [d, *C*H(CH$_3$)$_2$], 70.01 (t, OCH$_2$), 73.04 (d, CHN), 127.88 - 139.29 (d , C-Ar), 163.21 (s, C=N). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ = -5.1. Anal. Calcd for $C_{26}H_{28}NOP$ (401.51): C, 77.78; H, 7.03; N, 3.49; P, 7.71. Found: C, 77.56; H, 7.08; N, 3.33; P, 7.65.

(*S*)-2-(2-Diphenylphosphino-phenyl)-4-(1-hydroxy-1-methyl-ethyl)-4,5-dihydro-oxazole (*ent*-**1r**). To a solution of *ent*-**6n** (450 mg, 1.87 mmol) in 5 mL of dry CH_2Cl_2 were added 5 mg of *p*-TsOH and 766 mg (9.34 mmol) of dihydropyran. The solution was stirred until TLC monitoring indicated complete conversion (silica gel, PE/ethyl acetate 5:1, R_f = 0.20). The volatile material was removed *in vacuo* and the residue was flash chromatographed to yield 518 mg (90 %) of *ent*- **6n-THP** as a colorless oil. This was dissolved in 4 mL of dry THF. At -78°C was added a solution of lithium diphenylphosphide, prepared from 470 mg (2.53 mmol) of diphenyl phosphine and 1.43 mL (2.3 mmol) of *n*-BuLi (1.6 M) in 3 mL of dry THF at -78 °C. The cooling bath was removed and the mixture was stirred until the temperature reached -20 °C. Then 20 mL of CH_2Cl_2 and NH_4Cl solution were added. The organic phase was dried over $MgSO_4$, filtered and the solvents were removed *in vacuo*. Flash chromatography [silica gel, PE/ethyl acetate 10:1, R_f(*ent*-**1r-THP**) = 0.35] furnished 255 mg (41 %) of a colorless oil. This was dissolved in 5 mL of dry methanol. After addition of a catalytic amount of *p*-TsOH acid the solution was heated to 50 °C for 10 h. The volatile material was removed *in vacuo* and the residue purified by flash chromatography [silica gel, PE/ ethyl acetate 5:1, R_f(*ent*-**1r**) = 0.18] yielding 190 mg (90 %) of a colorless foam. $[\alpha]_D^{20}$ = +73.8 (c = 1.1, $CHCl_3$). ^{1}H NMR: δ = 0.97 (s, 3H, CH_3), 1.15 (s, 3H, CH_3), 1.74 [bs, 1H, OH H/D exchange], 4.12 - 4.33 (m, 3H, OCH_2, CHN), 6.91 (dd, *J* = 3.9 Hz, 2.6 Hz, 1H, Ar-H), 7.20 - 7.42 (m, 12H, Ar-H), 7.92 (ddd, *J* = 7.7 Hz, 3.7 Hz, 1.4 Hz, 1H, Ar-H). ^{13}C NMR: δ = 24.32 (q, CH_3), 27.56 (q, CH_3), 68.33 (t, OCH_2), 70.92 [s, $C(CH_3)_2$], 76.52 (d, CHN), 128.32, 128.43, 128.48, 128.52, 128.57, 128.60, 128.63, 129.55, 129.59, 130.68, (d, C-Ar), 131.95 (d, $J_{C,P}$ = 20.75 Hz, C-1'), 133.21, 133.48, 134.12, 134.39, 134.54 (d, C-Ar), 137.96 (d, $J_{C,P}$ = 10.3 Hz, C-Ar), 138.53 (d, $J_{C,P}$ = 8.2 Hz, C-Ar), 138.55 (d, $J_{C,P}$ = 23.0 Hz, C-2'), 163.91 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 6.7. HRMS: Calcd for $C_{24}H_{24}NO_2P$: 389.1544, Found: 389.1559.

(-)-(1*R*,2*S*,6*R*,7*S*)-4-(2-Diphenylphosphino-phenyl)-1,10,10-trimethyl-3-oxa-5-azatricyclo[5.2.1.0^{2,6}]dec-4-ene (*ent*-**1s**). According to general procedure IX: 73 % yield, white solid (light PE), mp 146.0 - 147.0 °C. $[\alpha]_D^{19.5}$ = - 19.1 (c = 0.47, CH_2Cl_2). ^{1}H NMR: δ = 0.75 (s, 3H, CH_3), 0.76 (s, 3H, CH_3), 0.88 (s, 3H, CH_3), 0.95 (m, 2H), 1.42 (m, 1H), 1.65 (m, 1H), 1.97 (d, *J* = 4.43 Hz, 1H), 3.93 (d, *J* = 8.5 Hz, 1H, CHN), 4.06 (d, *J* = 8.5 Hz, 1H, CHO), 6.88 (m, 1H), 7.31 (m, 14H), 7.88 (m, 1H). ^{13}C NMR: δ = 11.16 (q, CH_3), 18.73 (q, CH_3), 23.32 (q, CH_3), 25.91 (t), 31.98 (t), 46.76 (s), 48.32 (s), 48.66 (d), 76.32 (d,CHN), 91.09 (d, OCH), 127.98, 128.18, 128.21, 128.30, 128.34, 129.61, 130.30 (d, C-Ar), 132.21 (d, $J_{C,P}$ = 19 Hz, C-Ar), 133.99 (d, $J_{C,P}$ = 20.9 Hz, C-Ar), 134.15 (d, $J_{C,P}$ = 20.9 Hz, C-Ar), 138.24 (d, $J_{C,P}$ = 27 Hz, C-Ar), 138.40 (d, $J_{C,P}$ = 28 Hz, C-Ar), 139.14 (d, $J_{C,P}$ = 26 Hz, C-Ar), 164.79 (d, $J_{C,P}$ = 3 Hz, C-Ar). ^{31}P NMR ($CDCl_3$, 81.0 MHz): δ 5.74 (s). Anal. Calcd for $C_{29}H_{30}NOP$ (439.21): C, 79.25; H, 6.88; N, 3.19; P, 7.05. Found: C, 79.38; H, 6.99; N, 3.40; P, 7.24.

(-)-(*S*)-2-(2-Diphenylphosphino-phenyl)-4-isopropyl-4,5-dihydro-oxazole (**1d**). **General Procedure X (Method G).** To 19.5 mg (0.802 mmol) of magnesium, activated by „dry stirring", were added 3 mL of dry THF. After addition of 215 mg (0.802 mmol) of **7b**, the reaction was started by addition of a small amount of 1,2-dibromo-ethane. The mixture was stirred at reflux until the magnesium was consumed. Subsequently, a solution 191 mg (0.868 mmol) of chloro diphenylphosphine in 3 mL of dry THF was added. After 15 min the mixture was diluted with 10 mL of ether and filtered over a short silica gel pad. The solvents were removed *in vacuo* and the residue was flash chromatographed [30 g of silica gel, PE/ethyl acetate 95:5; R_f (**1d**) = 0.35 with eluent PE/ethyl acetate 80:20]. The resulting product was submitted to preparative MPLC (PE/ethyl acetate 9:1) to yield 89 mg (30 %) of **1d** as colorless needles, mp 84.0 - 85.0 °C. $[\alpha]_D^{20}$ = - 5.4 (CH_2Cl_2, c = 1.20). ^{1}H NMR: δ = 0.72, 0.83 [2d, 6H, $CH(CH_3)_2$, *J* = 6.7 Hz], 1.48 [dqq, *J* = 6.7 Hz, 1H, $CH(CH_3)_2$], 3.82 - 3.92 (m, 2H, OCH_2), 4.10 - 4.20 (m, 1H, CHN), 6.86 - 7.93 (m, 14H, Ar-H). ^{13}C NMR δ = 18.4, 18.9 [2q, $CH(CH_3)_2$, 32.8 [d, $CH(CH_3)_2$], 70.1 (t, OCH_2), 73.2 (d, CHN), 127.7 - 130.3(d, C-Ar), 132.0, 132.2 (s,

C-Ar), 133.6 - 134.5 (d, C-Ar), 138.1, 139.1 (s, C-Ar), 163.0 (s, C=N).[31]P NMR ($CDCl_3$, 81.02 MHz): δ = - 7.38. Anal. Calcd for $C_{24}H_{24}NOP$ (373.44): C, 77.19; H, 6.48; N, 3.75; P, 8.29. Found: C, 77.24; H, 6.59; N, 3.87; P, 8.15.

2-(2-Diarylphosphinophenyl)-oxazolines with Stereogenic Phosphorus

(-)-(S_C,S_P)- and **(+)-(S_C,R_P)-2-{2-[(2-Biphenylyl)-phenylphosphino]-phenyl}-4-methyl-4,5-dihydro-oxazole** (**2aA** and **2aB**).

The requisite **(2-biphenylyl)-phenylphosphine** was prepared according to equation 1: to 817 mg (33.59 mmol) of magnesium, activated by dry stirring, were added 8.00 g (30.5 mmol) of 2-bromobiphenyl and 40 mL of dry diethyl ether. The reaction was started by addition of a small amount of 1,2-dibromo-ethane. The mixture was stirred for 60 min at rt and additional 30 min at reflux. After cooling to rt, this solution was dropped by syringe within 1 h to a solution of 5.47 g (30.53 mmol) of dichlorophenylphosphine in 60 mL of dry diethyl ether. The resulting suspension was stirred overnight and then filtered under an inert atmoshere. The filtrate was dropped to a suspension of 869 mg (22.90 mmol) of $LiALH_4$ in 10 mL of dry diethyl ether and the resultant mixture stirred at rt for 4 h and additional 30 min at reflux. After cooling to rt, 200 mL of diethyl ether were added. Work-up according to Mihailovic[10], filtration from alumina and removal of the solvent *in vacuo* gave a crude product that was purified by kugelrohr distillation (150 - 160 °C, 0.2 mbar) yielding 5.68 g (71 %) of a colorless oil. ^{1}H NMR: δ = 5.13 (d, J = 223.2 Hz, 1H, P-H), 7.26 - 7.66 (m, 14H, Ar-H). ^{13}C NMR: δ = 127.26, 127.29, 127.96, 128.26, 128.35, 128.39, 129.18, 129.22, 129.85, 129.88 (d, C-Ar), 133.99 (d, J = 12.4 Hz, C-Ar), 134.44, 134.55, 134.68, 134.77 (d, C-Ar), 141.89 (d, J = 4.0 Hz, C-Ar), 146.62 (d, J = 8.8 Hz, C-Ar), 146.73 (s, C-Ar). ^{31}P NMR: δ = -47.3.

The oxazolines **2aA** and **2aB** were prepared according to general procedure IX: mixture of diastereomers which were separated by flash chromatography [silica gel, PE/ethyl acetate 85:15, R_f(**2aA**) = 0.15, R_f(**2aB**) = 0.11]; 12 % yield of **2aA** and 36 % yield of **2aB.**

2aA: Colorless, viscous oil. $[\alpha]_D^{20}$ = - 57.8 (c = 1.47, $CHCl_3$). ^{1}H NMR: δ = 0.96 (d, J = 6.4 Hz, 3H, CH_3), 3.62, 4.09-4.23 (m, 1H, 2H, OCH_2, CHN), 6.88 (ddd, J = 7.4 Hz, 3.7 Hz, 1.5 Hz, 1H, Ar-H), 7.10 (ddd, J = 7.7 Hz, 3.7 Hz, 1.1 Hz, 1H, Ar-H), 7.19 - 7.39 (m, 15H, Ar-H), 7.89 (ddd, J = 7.7 Hz, 3.7 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 20.85 (q, CH_3), 61.99 (d, CHN), 73.63 (t, OCH_2), 127.02, 127.13, 127.53, 127.75, 128.32, 128.41, 128.56, 129.61, 129.66, 129.90, 129.93, 129.96, 130.05, 130.37 (d, C-Ar), 131.63 (d, $J_{C,P}$ = 19.2 Hz, C-Ar), 132.85, 132.88, 134.31, 134.34, 134.78, 135.06 (d, C-Ar), 137.10 (d, $J_{C,P}$ = 9.6 Hz, C-Ar), 138.38 (d, $J_{C,P}$ = 15.3 Hz, C-Ar), 139.88 (d, $J_{C,P}$ = 28.3 Hz, C-Ar), 141.92 (d, $J_{C,P}$ = 6.8 Hz, C-Ar), 147.30 (d, $J_{C,P}$ = 30.0 Hz, C-Ar), 163.12 (d, $J_{C,P}$ = 3.0 Hz, C=N). ^{31}P NMR ($CDCl_3$, 36.19 MHz): δ = -11.3. Anal. Calcd for $C_{28}H_{24}NOP$ (421.48): C, 79.79; H, 5.74; N, 3.32; P, 7.35. Found: C, 79.59; H, 5.85; N, 3.26; P, 7.37.

2aB: Colorless, viscous oil. $[\alpha]_D^{20}$ = + 75.7 (c = 1.67, $CHCl_3$). ^{1}H NMR: δ = 1.03 (d, J = 6.5 Hz, 3H, CH_3), 3.49 (dd, J = 7.7 Hz, 1H, OCH_AHB), 4.05 (m, 1H, CHN), 4.18 (dd, J = 7.7 Hz, 1H, OCH_AH_B), 6.86-6.91 (m, 1H, Ar-H), 7.12 - 7.41 (m, 16H, Ar-H), 7.84 - 7.88 (m, 1H, Ar-H). ^{13}C NMR: δ = 20.95 (q, CH_3), 61.89 (d, CHN), 73.84 (t, OCH_2), 127.11, 127.32, 127.57, 127.74, 128.37, 128.47, 128.49, 128.59, 129.66, 129.71, 130.01, 130.08, 130.36 (d, C-Ar), 131.73 (d, $J_{C,P}$ = 19.8 Hz, C-Ar), 133.56, 133.59, 134.06, 134.10, 134.57, 134.85 (d, C-Ar), 136.71 (d, $J_{C,P}$ = 12.4 Hz, C-Ar), 138.38 (d, $J_{C,P}$ = 14.7 Hz, C-Ar), 139.79 (d, $J_{C,P}$ = 28.3 Hz, C-Ar), 141.85 (d, $J_{C,P}$ = 6.8 Hz, C-Ar), 147.70 (d, $J_{C,P}$ = 30.1 Hz, C-Ar), 163.65 (d, $J_{C,P}$ = 2.4 Hz, C=N). ^{31}P NMR ($CDCl_3$, 36.19 MHz): δ = - 11.7. Anal. Calcd for $C_{28}H_{24}NOP$ (421.48): C, 79.79, H, 5.74; N, 3.32; P, 7.35. Found: C, 79.61; H, 5.72; N, 3.26; P, 7.31.

(-)-(S_C,S_P)- and **(+)-(S_C,R_P)-2-{2-[(2-Biphenylyl)-phenyl-phosphino]-phenyl}-4-isopropyl-4,5-dihydro-oxazole** (**2bA** and **2bB**). The oxazolines **2bA** and **2bB** were prepared according to general procedure IX: mixture of diastereomers which were separated by flash chromatography (silica gel, PE/ethyl acetate 95:5, R_f(**2bA**) = 0.36, R_f(**2bB**) = 0.42); 15 % yield of **2bA** and 51 % yield of **2bB**. According to general procedure X: 30 % yield of **2bB**. The configuration of the phosphorus center of **2bA** was determined by X-ray crystal structure analysis of a palladium complex.

2bA: Colorless, viscous oil. $[\alpha]_D^{20}$ = - 44.6 (c = 1.10, $CHCl_3$). ^{1}H NMR: δ = 0.66, 0.74 [2d, *J* = 6.7 Hz, 6.8 Hz, 6H, CH(C*H*$_3$)$_2$], 1.59 [dqq, *J* = 6.6 Hz, 1H, C*H*(CH$_3$)$_2$], 3.89 - 4.03 (m, 2H, OCH_2), 4.09 (ddd, *J* = 6.6 Hz, 1H, CHN), 6.89 (ddd, *J* = 7.6 Hz, 3.6 Hz, 1.3 Hz, 1H, Ar-H), 7.00 (ddd, *J* = 7.6 Hz, 3.9 Hz, 1.1 Hz, 1H, Ar-H), 7.14 - 7.50 (m, 15H, Ar-H), 7.92 (ddd, *J* = 7.6 Hz, 3.7 Hz, 1.5 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.13 (q, CH_3), 18.54 (q, CH_3), 32.72 [d,*C*H(CH$_3$)$_2$), 69.84 (t, OCH_2), 72.94 (d, CHN), 126.93, 127.11, 127.49, 127.86, 128.23, 128.32, 128.48, 129.66, 129.72, 129.83, 129.87, 129.90, 129.97, 130.32 (d, C-Ar), 132.05 (d, $J_{C,P}$ = 21.5 Hz, C-1'), 133.05, 134.65, 134.74, 135.02 (d, C-Ar), 137.18 (d, $J_{C,P}$ = 9.7 Hz, C-Ar), 138.45 (d, $J_{C,P}$ = 14.5 Hz, C-Ar), , 139.55 (d, $J_{C,P}$ = 27.5 Hz, C-Ar), 141.87 (d, $J_{C,P}$ = 6.3 Hz, C-Ar), 147.03 (d, $J_{C,P}$ = 29.1 Hz, C-Ar), 162.87 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz):δ = -12.9. HRMS Calcd for $C_{30}H_{28}NOP$: 449.1909. Found: 449.1893.

2bB: Colorless, viscous oil. $[\alpha]_D^{20}$ = + 35.8, (c = 0.85, $CHCl_3$).^{1}H NMR: δ = 0.72, 0.85 [2d, *J* = 6.8 Hz, 6.7 Hz, 6H, CH(C*H*$_3$)$_2$], 1.55 [dqq, *J* = 6.5 Hz, 1H, C*H*(CH$_3$)$_2$], 3.72 - 3.84 (m, 2H, OCH_2), 4.05 (ddd, *J* = 7.1 Hz, 1H, CHN), 6.90 - 6.94 (m, 1H, Ar-H), 7.10 (ddd, *J* = 6.9 Hz, 3.3 Hz, 1H, Ar-H), 7.17 - 7.40 (m, 15H, Ar-H), 7.85 - 7.89 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.06 (q, CH_3), 19.10 (q, CH_3), 32.48 [d, *C*H(CH$_3$)$_2$], 69.95 (t, OCH_2), 72.63 (d, CHN), 127.07, 127.32, 127.55, 127.86, 128.31, 128.41, 128.49, 129.66, 129.72, 130.07, 130.14, 130.32 (d, C-Ar), 132.25 (d, $J_{C,P}$ = 20.8 Hz, C-1'), 133.91, 134.31, 134.39, 134.67 (d, C-Ar), 136.73 (d, $J_{C,P}$ = 14.1 Hz, C-Ar), 138.41 (d, $J_{C,P}$ = 14.0 Hz, C-Ar), 139.36 (d, $J_{C,P}$ = 27.4 Hz, C-Ar), 141.81 (d, $J_{C,P}$ = 6.3 Hz, C-Ar), 147.67 (d, $J_{C,P}$ = 29.6 Hz, C-Ar), 163.71 (s, C=N). ^{31}P NMR: = - 14.4. Anal. of a mixture of **2bA** and **2bB**, Calcd for $C_{30}H_{28}NOP$ (449.53): C, 80.16; H, 6.28; N, 3.12; P, 6.89. Found: C, 80.09; H, 6.59; N, 3.07; P, 6.63.

(-)-(S_C,S_P)- and **(-)-(S_C,R_P)-2-[2-(Naphthalen-1-yl-phenylphosphino)-phenyl]-4-isopropyl-4,5-dihydro-oxazole** (**2cA** and **2cB**).

The requisite **(1-naphtalenyl)-phenylphosphine**. was prepared following equation 2. All solvents were degassed before use. To a suspension of 150 mg (3.94 mmol) of $LiAlH_4$ in 10 mL of dry THF was added at - 15 °C a solution of 995 mg (3.67 mmol) of chloro-(1-naphtalenyl)-phenylphosphine[28] in 2 mL of dry THF. The resulting red solution was stirred at - 15 °C for 2 h and was then allowed to warm to rt. Then 20 mL of diethyl ether and 20 mL of NH_4Cl solution were added. Solids were dissolved by addition of 2 N HCl. The organic layer was dried over K_2CO_3, filtered and concentrated *in vacuo* and the residue kept under an inert atmosphere. Distillation in a microdistillation apparatus (bp 190 - 210°C, 0.03 mbar) gave the product as a colorless liquid.

The oxazolines **2cA** and **2cB** were prepared according to general procedure IX: 67% yield of a mixture of diastereomers (**2cA**:**2cB** = 1:1.6). Crystallization from hexane afforded pure **2cB**, preparative recycling MPLC (PE/ethyl acetate 95:5, 6 cycles) gave pure **2cA**. The configuration of the phosphorus center was determined by x-ray crystal structure analysis of a palladium complex of **2cB**.

2cA: Colorless oil. $[\alpha]_D^{20}$ = -27.5 (CH_2Cl_2, c = 0.53). ^{1}H NMR: δ = 0.51, 0.57 [2d, *J* = 6.7, 3H, CH(C*H*$_3$)$_2$], 1.28 [dqq, *J* = 6.5 Hz, 1H, C*H*(CH$_3$)$_2$], 3.77 - 3.88, 3.99 - 4.10 (2m, 2H and 1H, OCH_2, CHN), 6.90 (dd, *J* = 6.9 Hz, 3.5 Hz, 1H, Ar-H), 7.05 (ddd, *J* = 7.0 Hz, 5.7 Hz, 1H, Ar-H), 7.24 - 7.49 (m, 10H, Ar-H), 7.81 (d, *J* = 8.5 Hz, 1H, Ar-H), 7.84 (d, *J* = 8.3 Hz,1H, Ar-H), 7.94 (ddd, *J* = 7.6 Hz, 5.0 Hz, 1.3 Hz, 1H, Ar-H), 8.54 (dd, *J* = 6.5 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.14, 18.47 [2q, CH(*C*H$_3$)$_2$], 32.59 [d, *C*H(CH$_3$)$_2$], 70.01 (t, OCH_2), 73.09 (d, CHN), 125.51, 125.81, 126.00, (s and d, C-Ar),

126.03, 126.29, 126.68, 128.09, 128.40 128.42, 128.46, 128.56, 128.72, 129.06, 129.94, 129.98, 130.39, 131.63, 133.54, 134.48, 134.58, 134.85 (d, C-Ar), 133.47, 133.54, 135.38, 135.65, 137.26 (s, C-Ar), 162.95 (s, C=N). ^{31}P NMR: δ = - 17.33. Anal. Calcd for $C_{28}H_{26}NOP$ (423.55): C, 79.41; H, 6.19; N, 3.31; P, 7.31. Found: C, 79.51; H, 6.23; N, 3.39; P, 7.40.

2cB: Solid (*n*-hexane). Mp 113.0 - 113.5 °C. $[\alpha]_D^{20}$ = - 49.0 (CH_2Cl_2, c = 1.36). ^{1}H NMR: δ = 0.66, 0.76 [2d, *J* = 6.7 Hz, 6H, $CH(CH_3)_2$], 1.47 [dqq, *J* = 6.5Hz, 1H, $CH(CH_3)_2$], 3.73 - 3.83, 4.06 - 4.16 (2m, 2H and 1H, OCH2, CHN), 6.88 (ddd, *J* = 8.0 Hz, 3.9 Hz, 1.0 Hz, 1H, Ar-H), 7.05 (ddd, *J* = 7.8 Hz, 4.5 Hz, 1.2 Hz, 1H, Ar-H), 7.28 - 7.48 (m, 10H, Ar-H), 7.83 (d, *J* = 8.5 Hz, 1H, Ar-H), 7.85 (d, *J* = 8.8 Hz, 1H, Ar-H), 7.92 (ddd, *J* = 7.9 Hz, 5.0 Hz, 1.5 Hz, 1H, Ar-H), 8.56 (d, *J* = 7.0 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.30 (q, CH_3), 18.90 (q, CH_3), 32.72 [d, $CH(CH_3)_2$], 70.10 (t, OCH_2), 73.09 (d, CHN), 125.62, 125.81, 125.83 (s and d, C-Ar), 125.98, 126.01, 126.29, 126.67, 128.08, 128.34, 128.38, 128.40, 128.44, 128.54, 129.12, 129.90, 129.94, 130.33, 132.35, 134.18, 134.35, 134.46 (d, C-Ar), 132.18, 132.45, 133.34, 133.40, 135.48, 135.79, 135.98, 137.15, 137.28, 138.04, 138.36 (s, C-Ar), 163.17 (s, C=N). ^{31}P NMR: δ = - 17.46 Anal. Calcd for $C_{28}H_{26}NOP$ (423.55): C, 79.41; H, 6.19; N, 3.31; P, 7.31. Found: C, 79.56; H, 6.22; N, 3.42; P, 7.24.

(4*S*, R_P)- and (4*S*,S_P)-2-{2-[(2-Biphenylyl)-3,5-bis-(trifluoromethyl)-phenylphosphino]-phenyl}-4-isopropyl-4,5-dihydro-oxazole (2dA and 2dB). The requisite **(2-biphenylyl)-chloro-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine** was prepared according to equation 3.

Chloro-N,N-diethylamino-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine. To 587 mg (24.15 mmol) of magnesium, activated by *dry stirring*, were added 6.45 g (22.00 mmol) of 3,5-bis-(trifluoromethyl)-bromo-benzene and 20 mL of dry diethyl ether. The reaction was started by addition of a small amount of 1,2-dibromo-ethane. The mixture was stirred for 30 min at rt and additional 30 min at reflux. After cooling to rt it was dropped at 0 °C by syringe within 2.5 h to a solution of 3.83 g (22.0 mmol) of dichloro-N,N-diethylamino-phosphine in 25 mL of dry diethyl ether. The resulting suspension was stirred over night, filtered under an inert atmosphere through a pad of Celite and concentrated under reduced pressure. The crude product was kugelrohr distilled (150 - 155 °C, 15 mbar), yielding 5.12 g (67 %) of chloro-N,N-diethylamino-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine as a yellowish oil. ^{1}H NMR: δ = 1.15 (t, *J* = 7.2 Hz, 6H, CH_3), 3.10 (m, 4H, CH_2-N-P), 7.89 (bd, *J* = 0.6 Hz, 1H, Ar-H), 8.22 (bd, *J* = 3.4 Hz, 2H, Ar-H). ^{13}C NMR: δ = 13.23 (q, *J* = 6.2 Hz, CH_3),45.16 (t, *J* = 12.7 Hz, CH_2), 123.13 (d, $J_{C,F}$ = 273.0 Hz, CF_3), 123.45 (d, C-Ar), 131.53 (d, $J_{C,P}$ = 16.4 Hz, C-Ar), 132.19 (d, $J_{C,F}$ = 33.4 Hz, C-Ar),142.31 (d, $J_{C,P}$ = 42.3 Hz, C-Ar). ^{31}P NMR: δ = 139.

(2-Biphenylyl)-chloro-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine. At 0 °C a solution of 4.53 g (12.9 mmol) of chloro-N,N-diethylamino-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine in 10 mL of dry diethyl ether was dropped to a Grignard reagent prepared from 3.00 g (12.87 mmol) of 2-bromo-biphenyl and 0.34 g (14.16 mmol) of magnesium in 10 mL of dry diethyl ether. After stirring for 2 h at rt, dry HCl gas was bubbled through the solution until it became acidic. A precipitate was formed that was filtered off under an inert atmosphere and washed several times with diethyl ether. The filtrate was concentrated under reduced pressure and the residue was purified by kugelrohr distillation (170 - 180 °C, 0.2 mbar), yielding 3.76 g (67 %) of (2-biphenylyl)-chloro-[3,5-bis-(trifluoromethyl)-phenyl]-phosphine as a yellowish oil. ^{1}H NMR: δ = 7.05 - 7.17 (m, 2H, Ar-H), 7.21 - 7.38 (m, 4H, Ar-H), 7.48 - 7.79 (m, 5H, Ar-H), 7.89 - 8.01 (m, 1H, Ar-H). ^{13}C NMR: δ = 122.96 (d, $J_{C,F}$ = 273 Hz, CF_3), 123.55 (d, C-Ar), 127.17, 128.46, 129.39, 130.04, 131.00, 132.17, 132.54, 133.52 (d, C-Ar), 131.16, 132.99 (2s, C-Ar), 142.40 (d, $J_{C,P}$ = 45.2 Hz, C-Ar), 138.80 (d, $J_{C,P}$ = 6.2 Hz, C-Ar), 146.61 (d, $J_{C,P}$ = 29.2 Hz, C-Ar). ^{31}P NMR: δ = 64.5.

The oxazolines **2dA** and **2dB** were prepared according to general procedure X: mixture of diastereomers which were separated by flash chromatography [silica gel, PE/ethyl acetate 4:1, R_f(**2dA**) = 0.45, R_f(**2dB**) = 0.50]; 41 % yield of **2dA** and 6 % yield of **2dB**.

2dA: Colorless gum. $[\alpha]_D^{20}$ = -33.5, (c = 2.19, $CHCl_3$). ^1H NMR: δ = 0.66 (d, *J* = 7.0 Hz, 3H, CH_3), 0.68 (d, *J* = 6.6 Hz, 3H, CH_3), 1.50 - 1.59 [m, *J* = 6.6 Hz, 1H, C*H*$(CH_3)_2$], 3.97 - 4.10 (m, 2H, OCH_2), 4.26 (ddd, *J* = 8.8 Hz, 7.0 Hz, 1H, CHN), 6.84 (ddd, *J* = 7.4 Hz, 2.9 Hz, 1H, Ar-H), 6.92 (dd, *J* = 7.4 Hz, 3.8 Hz, 1H, Ar-H), 7.18 - 7.49 (m, 12H, Ar-H), 7.72 (br. s, 1H, Ar-H), 7.98 (dd, *J* = 7.4 Hz, 3.7 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.18 (q, CH_3), 18.41 (q, CH_3), 32.93 [d, *C*H$(CH_3)_2$], 70.18 (t, OCH_2), 73.40 (d, CHN), 121.97 (d, C-Ar), 123.31 (d, $J_{C,F}$ = 273.0 Hz, CF_3-Ar), 127.17, 127.47, 127.66, 128.71, 128.98, 129.45, 130.03, 130.76 (d, C-Ar), 131.18 (d, $J_{C,P}$ = 6.2 Hz, C-Ar), 132.16 (d, $J_{C,P}$ = 22.0 Hz, C-Ar), 132.82, 134.28, 134.59 (d, C-Ar), 135.73 (d, $J_{C,P}$ = 9.6 Hz, C-Ar), 137.32 (d, $J_{C,P}$ = 27.1 Hz, C-Ar), 141.27 (d, $J_{C,P}$ = 5.7 Hz, C-Ar), 143.23 (d, $J_{C,P}$ = 22.6 Hz, C-Ar), 146.73 (d, $J_{C,P}$ = 27.1 Hz, C-Ar), 161.97 (d, $J_{C,P}$ = 2.8 Hz, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz) δ = - 10.3. Anal. Calcd for $C_{32}H_{26}F_6NOP$ (585.53): C, 65.64; H, 4.48; P, 5.29. Found: C, 65.53; H, 4.56; P, 5.16.

2dB: colorless gum. $[\alpha]_D^{20}$ = + 9.1, (c = 2.77, $CHCl_3$). ^1H NMR: δ = 0.67, 0.73 [2d, *J* = 6.7 Hz, 6H, CH(C*H*$_3)_2$], 1.50 - 1.56 [m, *J* = 6.6 Hz, 1H, C*H*$(CH_3)_2$], 3.86 - 3.96 (m, 2H, OCH_2), , 4.14 - 4.22 (m, 1H, CHN), 6.94 - 6.97 (m, 2H, Ar-H), 7.11 - 7.48 (m, 10H, Ar-H), 7.54 (br. d, 2H, Ar-H), 7.73 (br. s, 1H, Ar-H), 7.95 (ddd, *J* = 7.4 Hz, 3.7 Hz, 1H, Ar-H). ^{13}C NMR: δ = 17.98 (q, CH_3), 18.66 (q, CH_3), 32.52 [d, *C*H$(CH_3)_2$], 69.88 (t, OCH_2), 73.07 (d, CHN), 121.79 (d, C-Ar), 123.34 (d, $J_{C,F}$ = 272.4 Hz, CF_3-Ar), 127.28, 127.66, 127.71, 128.82, 129.18, 129.51, 129.56, 130.03, 130.44, 130.50, 130.78 (d, C-Ar), 131.24 (d, $J_{C,P}$ = 6.8 Hz, C-Ar), 132.38 (d, $J_{C,P}$ = 19.6 Hz, C-Ar), 133.60, 133.90, 134.08, 134.58 (d, C-Ar), 135.13 (d, $J_{C,P}$ = 13.0 Hz, C-Ar), 137.04 (d, $J_{C,P}$ = 26.6 Hz, C-Ar), 141.28 (d, $J_{C,P}$ = 5.7 Hz, C-Ar), 143.77 (d, $J_{C,P}$ = 20.3 Hz, C-Ar), 147.81 (d, $J_{C,P}$ = 28.8 Hz, C-Ar), 162.28 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 10.9. Anal. Calcd for $C_{32}H_{26}F_6NOP$ (585.53): C, 65.64; H, 4.48; P, 5.29. Found: C, 65.57; H, 4.73; P, 5.25.

(-)-(S_C,S_P)- and **(+)-(S_C,R_P)-2-{2-[(2-Biphenylyl)-phenylphosphino]-phenyl}-4-*tert*-butyl-4,5-dihydro-oxazole** (**2eA** and **2eB**). According to general procedure IX: mixture of diastereomers which were separated by flash chromatography [silica gel, PE/ethyl acetate 96:4, R_f(**2eA**) = 0.44, R_f(**2eB**) = 0.50]; 20 % yield of **2eA** and 40 % yield of **2eB**.

2eA: Colorless, viscous oil. $[\alpha]_D^{20}$ = -56.4, (c = 0.62, $CHCl_3$). ^1H NMR: δ = 0.70 [s, 9H, C(C*H*$_3)_3$], 3.93 (dd, *J* = 9.0 Hz, 7.9 Hz, 1H,CHN), 4.02 (dd, *J* = 9.0 Hz, 8.2 Hz, 1H, OC*H*$_A$H$_B$), 4.06 (dd, *J* = 8.2 Hz, 7.9 Hz, 1H, OCH$_A$*H*$_B$), 6.90 (ddd, *J* = 7.7 Hz, 3.5 Hz, 1.3 Hz, 1H, Ar-H), 7.00 (ddd, *J* = 7.2 Hz, 4.3 Hz, 1.5 Hz, 1H, Ar-H), 7.11 - 7.46 (m, 15H, Ar-H), 7.93 (ddd, *J* = 7.5 Hz, 3.8 Hz, 1.6 Hz, 1H, Ar-H). ^{13}C NMR: δ = 25.75 [q, C(*C*H$_3)_3$], 33.91 [s, *C*$(CH_3)_3$], 68.40 (t, OCH_2), 76.80 (d, CHN), 126.81, 127.06, 127.42, 127.87, 128.11, 128.14, 128.23, 128.42, 129.71, 129.77, 129.85, 129.92, 130.28 (d, C-Ar), 132.36 (d, $J_{C,P}$ = 22.0 Hz, C-1'), 133.03, 134.76, 135.05 (d, C-Ar), 137.39 (s, C-Ar), 138.40 (d, $J_{C,P}$ = 14.1 Hz, C-Ar), 139.35 (d, $J_{C,P}$ = 27.5 Hz, C-Ar), 141.80 (d, $J_{C,P}$ = 6.1 Hz, C-Ar), 146.81 (d, $J_{C,P}$ = 27.9 Hz, C-Ar), 162.67 (d, C=N). ^{31}P NMR ($CDCl_3$, 36.19 MHz): δ = - 13.3. Anal. Calcd for $C_{31}H_{30}NOP$ (463.56): C, 80.32; H, 6.52, N, 3.02; P, 6.68. Found: C, 80.28; H, 6.57, N, 3.25; P, 6.62.

2eB: Solid. Mp 129.0 - 131.0 °C. $[\alpha]_D^{20}$ = + 14.1, (c = 1.13, $CHCl_3$). ^1H NMR: δ = 0.76 [s, 9H, C(C*H*$_3)_3$], 3.78 (dd, *J* = 10.2 Hz, 7.9 Hz, 1H,CHN), 3.88 (dd, *J* = 8.2 Hz, 7.9 Hz, 1H, OC*H*$_A$H$_B$), 3.96 (dd, *J* = 10.2 Hz, 8.2 Hz, 1H, OCH$_A$*H*$_B$), 6.94 (ddd, *J* = 7.3 Hz, 3.8 Hz, 1.6 Hz, 1H, Ar-H), 7.07 (ddd, *J* = 7.7 Hz, 3.5 Hz, 1.0 Hz, 1H, Ar-H), 7.17 - 7.40 (m, 15H, Ar-H), 7.90 (ddd, *J* = 7.3 Hz, 3.6 Hz, 1.9 Hz, 1H, Ar-H). ^{13}C NMR: δ = 25.91 [q, C(*C*H$_3)_3$], 33.66 [s, *C*$(CH_3)_3$], 66.56 (t, OCH_2), 76.18 (d, CHN), 127.02, 127.32, 127.53, 127.90, 128.24, 128.34, 128.46, 129.68, 129.74, 130.13, 130.17, 130.29 (d, C-Ar), 132.47 (d, $J_{C,P}$ = 21.7 Hz, C-1'), 134.10, 134.25, 134.50, 134.53 (d, C-Ar), 136.86 (d, $J_{C,P}$ = 15.2 Hz, C-Ar), 138.54 (d, $J_{C,P}$ = 13.4 Hz, C-Ar), 139.2 (d, $J_{C,P}$ = 27.2 Hz, C-Ar), 141.81 (d, $J_{C,P}$ = 6.2 Hz, C-Ar), 147.69 (d, $J_{C,P}$ = 29.4 Hz, C-Ar), 163.72 (s, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 13.9. Anal. Calcd for $C_{31}H_{30}NOP$ (463.56): C, 80.32; H, 6.52; N, 3.02; P, 6.68. Found: C, 80.20; H, 6.59; N, 3.31; P, 6.61.

(R_C,S_P)- and **(R_C,R_P)-2-{2-[(2-Biphenylyl)-phenylphosphino]-phenyl}-4-phenyl-4,5-dihydro-oxazole** (*ent*-**2fA** and *ent*-**2fB**). According to general procedure IX: mixture of diastereomers which were separated by flash chromatography [silica gel, PE/ethyl acetate 95:5, R_f(*ent*-**2fA**) = 0.44, R_f(*ent*-**2fB**) = 0.37]; 51 % yield of *ent*-**2fA** and 15% yield of *ent*-**2fB**.

ent-**2fA**: Colorless, viscous oil. $[\alpha]_D^{20}$ = - 47.7, (c = 1.29, $CHCl_3$).^{1}H NMR: δ = 3.88 (dd, *J* = 8.6 Hz, 8.3 Hz, 1H, OCH_AH_B), 4.50 (dd, *J* = 10.1 Hz, 8.3 Hz, 1H, CHN), 5.13 (dd, *J* = 10.1 Hz, *J* = 8.6 Hz, 1H, OCH_AH_B), 6.95 - 7.43 (m, 22H, Ar-H), 7.98 - 8.02 (m, 1H, Ar-H). ^{13}C NMR: δ = 70.20 (d, CHN), 74.65 (t, OCH_2), 126.89, 127.01, 127.28, 127.34. 127.47, 127.88, 128.37, 128.47, 128.51, 128.55, 129.62, 129.67, 130.13, 130.20, 130.47, 130.51, 130.63 (d, C-Ar), 131.59 (d, $J_{C,P}$ = 20.3Hz, C-1'), 133.68, 133.70, 134.43, 134.54, 134.83 (d, C-Ar), 136.91 (d, $J_{C,P}$ = 12.8 Hz, C-Ar), 138.36 (d, $J_{C,P}$ = 14.7 Hz, C-Ar), 140.08 (d, $J_{C,P}$ = 28.3 Hz, C-Ar), 141.74 (d, $J_{C,P}$ = 6.5 Hz, C-Ar), 142.16 (d, N-*C*H-C-Ar), 147.77 (d, $J_{C,P}$ = 29.8 Hz, C-Ar), 164.95 (d, $J_{C,P}$ = 2.3 Hz, C=N). ^{31}P NMR($CDCl_3$, 36.19 MHz): δ = - 11.9. Anal. Calcd for $C_{33}H_{26}NOP$ (483.55): C, 81.97; H, 5.42; N, 2.90; P, 6.41. Found: C, 81.42; H, 5.62; N, 2.74; P, 6.16.

ent-**2fB**: Colorless, viscous oil. $[\alpha]_D^{20}$ = - 58.9, (c = 2.00, $CHCl_3$). ^{1}H NMR: δ = 3.95 (dd, *J* = 8.4 Hz, 8.2 Hz, 1H, OCH_AH_B), 4.55 (dd, *J* = 10.2 Hz, 8.2 Hz, 1H, CHN), 5.28 (dd, *J* = 10.2 Hz, 8.4 Hz, 1H, OCH_AH_B), 6.78 (dd, *J* =6.8 Hz, 2.5 Hz, 1H, Ar-H), 6.88 (br. d, *J* = 7.9 Hz, 1H, Ar-H), 6.94 (ddd, *J* = 7.3 Hz, 3.6 Hz, 1.5 Hz, 1H, Ar-H), 7.01-7.42 (m, 19H, Ar-H), 8.00 (ddd, *J* = 7.6 Hz, 3.6 Hz, 1.4 Hz, 1H, Ar-H). ^{13}C NMR: δ = 70.35 (d, CHN), 74.31 (t, OCH_2), 126.57, 126.87, 127.05, 127.13, 127.32, 127.84, 128.21, 128.33, 128.42, 128.45, 128.52, 129.42, 129.47, 130.09, 130.12, 130.21, 130.29, 130.57 (d, C-Ar), 130.96 (d, $J_{C,P}$ = 19.8 Hz, C-1'), 132.80, 132.83, 134.74, 134.82, 135.11 (d, C-Ar), 137.35 (d, $J_{C,P}$ = 7.3Hz, C-Ar), 138.67 (d, $J_{C,P}$ = 15.8 Hz, C-Ar), 140.60 (d, $J_{C,P}$ = 29.4 Hz, C-Ar), 141.93 (d, $J_{C,P}$ = 6.9 Hz, C-Ar), 142.45 (s, N-CH-C-Ar), 147.43 (d, $J_{C,P}$ = 29.8 Hz, C-Ar), 163.87 (d, $J_{C,P}$ = 3.5 Hz, C=N). ^{31}P NMR ($CDCl_3$, 36.19 MHz): δ = - 12.1. HRMS: Calcd for $C_{33}H_{26}NOP$: 483.1752. Found: 483.1731.

Aryloxazolines with Sulfur and Selenium as Soft Donor Center

(-)-(*S*)-4-Isopropyl-2-(2-phenylsulfanyl-phenyl)-4,5-dihydro-oxazole (**3**). A solution of 651 mg (2.43 mmol) of bromoxazoline **7b** was added dropwise to a suspension of 58.8 mg (2.43 mmol) of magnesium, activated by "dry stirring", in 3 mL of dry THF. The reaction was started with a small amount of iodine. After stirring for 10 h at rt, a solution of 2.18 g (10.0 mmol) of diphenyldisulfide in 2 mL of dry THF was added. The resulting solution was stirred for 1 h and heated to reflux for five more h, then cooled to rt. After addition of 20 mL of ether, the mixture was washed twice with saturated NH_4Cl solution, once with degassed 2 N NaOH solution under nitrogen atmosphere, once with brine and dried over $MgSO_4$. The solvent was removed under reduced pressure und the residue was chromatographed [PE/ethyl acetate 90:10, R_f (**3**) = R_f (**8**) = 0.25]. The resulting mixture of **3** and **8** was heated to 170 °C at 0.01 mbar to remove the byproduct **8**. The residue was dissolved in THF and filtered through a short pad of silica gel. Evaporation of the solvent yielded 463.7 mg (64 %) of **3** as a colorless oil. $[\alpha]_D^{20}$ = -72.0 (c = 1.835, $CHCl_3$). ^{1}H NMR: δ = 0.98 (d, *J* = 6.8 Hz, 3H, CH_3), 1.09 (d, *J* = 6.7 Hz, 3H, CH_3), 1.89 [septet, *J* = 6.7 Hz, 1H, $CH(CH_3)_2$], 4.14 - 4.23 (m, 2H, CHN, OCH_AH_B), 4.39 (dd, *J* = 9.0 Hz, 7.6 Hz, 1H, OCH_AH_B), 6.82 (dd, *J* = 7.8 Hz, 1.4 Hz, 1H, Ar-H), 7.09 - 7.20 (m, 2H, Ar-H), 7.38 - 7.44 (m, 3H, Ar-H), 7.52 - 7.58 (m, 2H, Ar-H), 7.78 (dd, *J* = 7.6 Hz, 1.8 Hz, 1H, Ar-H). ^{13}C NMR: δ = 18.2 (q, CH_3), 18.7 (q, CH_3), 32.8 [d, $CH(CH_3)_2$], 69.5 (t, OCH_2), 73.2 (d, CHN), 124.2 (d, C-Ar), 125.3 (s, C-Ar), 127.5, 128.4, 129.3, 129.7, 130.4 (5d, C-Ar), 133.4 (s, C-Ar), 134.7 (d, C-Ar), 140.5 (s, C-Ar), 162.0 (s, CN). Anal. Calcd for $C_{18}H_{19}NOS$ (297.41): C, 72.69; H, 6.44; N, 4.71; S, 10.78. Found: C, 72.48; H, 6.39; N, 4.65; S, 10.71.

(-)-(*S*)-4-Isopropyl-2-(2-phenylselanyl-phenyl)-4,5-dihydro-oxazole (4). In the same way as above 700 mg (2.61 mmol) of bromoxazoline **7b** were transformed into the Grignard reagent with 63.6 mg (2.61 mmol) of activated magnesium in 3 mL of dry THF. Then a solution of 653.0 mg (2.09 mmol) of diphenyldiselenide in 2 mL of dry THF was added. After stirring for 3 h at rt, the starting material had disappeared. After work-up and purification by flash chromatography [silica gel, PE/ethyl acetate 95:5, R_f(**4**) = 0.50, R_f(**8**) = 0.35], 612 mg (85 %) of **4** were obtained as a colorless oil, that crystallized upon standing at 0 °C. Mp. 47.0 - 48.0 °C. $[\alpha]_D^{20}$ = - 58.3 (c = 2.705, $CHCl_3$). ^{1}H NMR: δ = 1.02 (d, *J* = 6.7 Hz, 3H, CH_3), 1.15 (d, *J* = 6.7 Hz, 3H, CH_3), 1.87 [septet, *J* = 6.7 Hz, 1H, C*H*(CH_3)$_2$], 4.10 - 4.27 (m, 2H, CHN, OCH_ACH_B), 4.44 (dd, *J* = 8.9 Hz, 8.9 Hz, 1H, OCH$_A$CH_B), 6.88 - 6.91 (m, 1H, Ar-H), 7.09 - 7.17 (m, 2H, Ar-H), 7.37 - 7.46 (m, 3H, Ar-H), 7.71 - 7.74 (m, 2H, Ar-H), 7.82 - 7.85 (m, 1H, Ar-H). ^{13}C NMR: δ = 18.9, 19.1 (2q, CH_3), 33.4 [d, *C*H(CH_3)$_2$], 70.3 (t, OCH_2), 73.6 (d, CHN), 124.6 (d, C-Ar), 125.5 (s, C-Ar), 128.86, 128.91, 129.7, 129.8 (4d, C-Ar), 130.4 (s, C-Ar), 130.8, 137.4 (2d, C-Ar), 138.6 (s, C-Ar), 162.6 (s, CN). Anal. Calcd for: $C_{18}H_{19}NOSe$ (344.31): C, 62.79; H, 5.56; N, 4.07. Found: C, 62.50; H, 5.55; N, 4.06.

(-)-1,3-Bis[(*S*)-4-isopropyl-4,5-dihydro-oxazol-2-yl]benzene (14). 3.84 g (30 mmol) of 1,3-dicyanobenzene were added to a mixture of 204 mg (0.375 mmol) freshly dried $ZnCl_2$ in 90 mL of dry chlorobenzene. The mixture was heated to reflux and 9.3 g (90.0 mmol) of (+)-(*S*)-valinol were added dropwise. Heating was maintained for three days, while a light stream of nitrogen was passed through the apparatus. The mixture was cooled to rt and the solvent was evaporated *in vacuo*. The residue was dissolved in CH_2Cl_2 and the solution extracted three times with 40 mL of water. The combined aqueous layers were reextracted once with CH_2Cl_2 and the combined organic layers were dried over Na_2SO_4, filtered and the solvent was removed *in vacuo*. The residue was purified by flash chromatography [800g silica gel, PE/ethyl acetate 5:1, R_f(**14**) = 0.18)]. Recrystallization from ethyl acetate yielded 5.7 g (65 %) of colorless needles (ethyl acetate). Mp 66.0 - 67.0 °C. $[\alpha]_D^{25}$ = - 91.0 (c = 2.67, CH_2Cl_2). ^{1}H NMR: δ = 0.92, 1.02 [2d, *J* = 6.7 Hz, 2 x 6H, CH_3], 1.85 [dqq, *J* = 6.4 Hz, 2H, C*H*(CH_3)$_2$], 4.06 - 4.16 (m, 4H, OCH_2), 4.35 - 4.45 (m, 2H, CHN), 7.43 (t, *J* = 7.8 Hz, 1H, Ar-H), 8.05 (dd, *J* = 1.7 Hz, 7.8 Hz, 2H, Ar-H), 8.49 (t, *J* = 1.5 Hz, 1H, Ar-H). ^{13}C NMR (Aceton-d_6): δ = 18.53, 18.92 (2q, CH_3), 33.65 [d, *C*H(CH_3)$_2$], 71.19 (t, OCH_2), 73.43 (d, CHN), 128.54 (d, C-Ar), 129.28 (s, C-Ar), 129.54 (d, C-Ar), 131.50 (d, C-Ar), 163.23 (s, C=N). Anal. Calcd for $C_{18}H_{24}N_2O_2$ (300.40): C, 71.97; H, 8.05; N, 9.33. Found: C, 72.17; H, 8.04; N, 9.49.

(+)-2,6-Bis[(*S*)-4-isopropyl-4,5-dihydro-oxazol-2-yl]thiobenzene (15). To a solution of 900 mg (3 mmol) of **14** in 20 mL of dry benzene were added 1.35 mL (9.0 mmol) of TMEDA and 9.0 mmol of LDA, prepared from 1.4 mL (10.5 mmol) of diisopropylamine in 10 mL of dry benzene by addition of 9.0 mmol of n-BuLi over a 30 min period. The mixture was stirred for 4 h, during which the color of the solution turned to deep brown and a brown precipitate was formed. Then 30 mL of dry THF were added and the precipitate dissolved. The solution was cooled to - 20 °C and a precooled suspension (- 20 °C) of 100 mg (3.0 mmol) of sulfur in 3 mL of dry THF was added by means of a double ended needle. The resulting solution was allowed to warm to rt overnight. Then 4.5 mL of 3 M HCl were added and stirring was continued for additional 20 min. A yellowish oil was formed. After neutralization with 1 M aqueous NaOH, the organic layer was extracted twice with 50 mL portions of sat. NH_4Cl solution and three times with 50 mL of water. The combined aqueous layers were extracted three times with 70 mL of ether. The combined organic layers were dried over Na_2SO_4, filtered, and the solvent was removed *in vacuo*. The brown residue was flash filtered under an atmosphere of nitrogen [40 g silica gel (degassed), PE/ethyl acetate (degassed) 6:5, R_f(**14**) = 0.55, R_f(**15**) = 0.10]. Recrystallization (ethyl acetate) under nitrogen yielded 480 mg (48 %) of yellowish needles, mp 98.0 - 99.0 °C. $[\alpha]_D^{20}$ = + 61.5 (c = 0.63, CH_3OH). ^{1}H NMR: δ = 0.98, 1.05 (4d, *J* = 6.7 Hz, 2 x 6H, CH_3),

1.88 [dqq, J = 6.6 Hz, 2H, C*H*$(CH_3)_2$], 4.15 - 4.25 (m, 4H, OCH_2), 4.41 - 4.51 (m, 2H, CHN), 7.00 (t, J = 7.8 Hz, 1H, Ar-H) 7.77 (d, J = 7.8 Hz, 2H, Ar-H), 8.49 (t, J = 1.5 Hz, 1H, Ar-H), 12.96 (br. s, SH). ^{13}C NMR: δ = 18.47, 18.73 (2q, CH_3), 32.86 [d, *C*H$(CH_3)_2$], 70.02 (t, OCH_2), 71.98 (d, CHN), 121.37 (d, C-Ar), 126.12 (s, C-Ar), 132.61 (d, C-Ar), 148.27 (s, C-Ar), 165.03 (s, C=N). Anal. Calcd for $C_{18}H_{24}N_2O_2S$ (332.46): C, 65.03; H, 7.23; N, 8.43; S, 9.64. Found: C, 65.00; H, 7.38; N, 8.29; S, 9.45.

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